The Builder.

Vol. XLIX. No. 2237. Saturday, December 19, 1885.

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Micro-organisms and London Water.

SIR FRANCIS BOLTON'S last report of the water supplied to London by the several Metropolitan Companies contained a letter addressed to the Local Government Board by Dr. Percy F. Frankland, which has given rise to somewhat varied comment in the columns of the London dailies. Dr. Frankland's letter refers to the results obtained from the examination by the gelatine method of the water supplied by the different companies, with a view to discover the organic impurities existing in each. This biological examination was carried on for a short time by the late Dr. Angus Smith, though in a somewhat different manner. Sir Francis Bolton proposes to issue the results obtained by Dr. Frankland from month to month. Before inquiring into the revelations of the gelatine method, it will be interesting to glance at the reports issued for the first half of the present year by Professor Frankland, F.R.S., and Messrs. Crookes, Odling, and Tidy, which afford, according to Sir Francis Bolton, the most reliable information obtainable respecting the quality of the London water supply. The question of the purification and filtration of the river is one of perennial interest. The amount of literature which has been contributed in this connexion is appalling, and yet it is still practically limitless. We see no reason to anticipate any alleviation in this respect until a more equitable base of operations has been arrived at. Much has been suggested and much has been done, but the limit of possible improvements seems to be exhaustless. The Metropolitan Board of Works is doing its share (though very late in the day) towards solving the problem. At the last meeting (December 11th) the Works Committee recommended the expenditure of 3,260*l.* in respect of the deodorisation works for the treatment of sewage in progress at Crossness Pumping Station. Returning to the matter of chemical analysis, Messrs. Crookes, Odling, and Tidy found that out of 1,049 samples of water collected from the mains of the seven companies taking their supply from the Thames and the Lea, the whole were "clear, bright, and well filtered," attributing any increase in the proportion of organic matter to the effects of occasional storm rainfalls. They found that the mean quantity of organic carbon present in the Thames-derived water examined during the six months was 0·153 part in 100,000 parts of water, or about a quarter of a grain of organic matter per gallon. February and March produced samples in which the organic carbon exceeded 0·20 part in 100,000, whilst 0·256 part, or less than half a grain, represented the organic matter per gallon. They assume that this result establishes the fact that the amount of organic impurity present is infinitesimal, and they then refer to the report of the last Royal Commission on Water Supply, where it is concluded that the presence of organic matter in small quantities is not necessarily prejudicial to health. Messrs. Crookes, Odling, and Tidy are inclined to be somewhat apologetic in reference to the present state of matters when they advance the doubtful argument that, "by the authority of the Legislature, and after full inquiry by Parliamentary Committees and Royal Commissions, upwards of 90 per cent. of the water supply to London is at the present drawn from river sources." Professor Frankland points out that even the minimum presence of organic matter is no guarantee of the non-existence of the germs of zymotic disease, and that the treatment which the companies have yet adopted will not insure the removal of such morbific matters. It has been recently demonstrated that no system of filtration has been discovered which would effectually prevent the access of those lower forms of animal life which are known to simulate the organisms causing zymotic disease. On this account alone it has been proposed by several of the water companies to ultimately abandon the rivers Thames and Lee as sources of water supply, and with that object in view they have sunk deep wells into the chalk, believing in the utilisation of subterranean waters which have undergone natural filtration through great thicknesses of gravel and sand. It will be well before leaving this part of the subject to consider briefly how far subterranean sources are likely to meet a large demand in that direction, should river-derived water eventually become unpopular.

In the south-east of England, chalk is the chief water-bearing bed. It is not so porous or permeable as some of the sand-beds; but its extent of outcrop and thickness render it of the most importance. Mr. Charles E. de Rance, secretary of the British Association Water Committee, in his work on "The Water Supply of England and Wales," shows that "the rainfall which this country receives is more than sufficient to meet all the requirements of human consumption, manufacturing interests, and the purposes of canalisation; and yet," he remarks, "with these resources, large districts still suffer from all the ills due to a polluted water-supply." The danger from pollution in the case of wells is not sufficiently understood, and the present state of the law in regard to this matter is capable of considerable improvement. Mr. W. Whitaker, of the Geological Survey of England, in an interesting paper on "Chalk as a Source of Water-supply," alludes to the case of Ballard *v.* Tomlinson, where, by a recent legal decision, the judgment of Mr. Justice Pearson, it has been declared lawful for any one to pour filth or noxious matter down an unused well, without regard to the fact that he may thereby pollute the source from which his neighbours draw their supply. Mr. Whitaker remarks, "It would be a work of no great difficulty, therefore, to utterly spoil most well waters, and this might not only be done by inadvertence, as in the case alluded to, but apparently of malice aforethought." These remarks apply equally to all water-bearing beds. Besides the above danger, there is another equally to be guarded against at a time when alterations are being made upon deep wells. The force of this remark could not be more clearly demonstrated than by reference to the numerous cases of typhoid fever which occurred several years ago in Caterham, and in the town of Redhill, eight miles distant, which were afterwards shown to be the effect of the excrements of a workman suffering from the disease, gaining access to the well at the first-named place.

Of 144,592,772 gallons supplied during a recent year by the eight companies to the inner circle of the metropolis, 9,567,634 gallons were from deep wells in the chalk, and the remainder, consisting of 71,710,878 gallons from the Thames, and 63,314,260 gallons from the Lea, of which the water drawn from the Lea, and distributed by the New River and East London companies was found to be of uniformly better average than that of the Thames. Prof. Frankland found on an analysis of water taken regularly throughout the year from the mains, at places recommended by the companies themselves, that while the river waters were open to objections, the water from the deep wells in the chalk was of uniformly good quality. It will have been observed by many resident in London,—visitors have frequently remarked it,—that during the summer months, while the water in one part of the metropolis is agreeably cool, in another it is warm and unpalatable. Very few, however, know the reason of this. It is to be found in the fact that the former is deep-well water, while the latter is derived from the rivers. The proportion of organic matter present in the deep-well water, taking an average on the last ten years, was little more than one half that existing in water derived from the Lea, and much less than one half that obtained from the Thames. Though small quantities of vegetable organic matter are not objectionable

in drinking-water, organic matter in river-water which receives sewage is another consideration. In one of the reports of the Royal Commission on Water Supply, it is concluded "that, when efficient measures are adopted for excluding the sewage and other pollutions from the Thames and the Lea, and their tributaries, and for ensuring perfect filtration, water taken from the present sources will be perfectly wholesome, and of suitable quality for the metropolis." It has been urged since that the expense attached to such a scheme, and, indeed, any scheme for the entire exclusion of all sewage from rivers, is so great as to render it a practical impossibility. Irrigation and intermittent downward filtration are the methods which have been tried in the towns of the Thames basin. Chemical treatment has obtained comparatively poor results. These methods of purification have greatly improved the appearance of the river-waters, and yet, we have it upon the highest authority, that not one of these processes, executed with the greatest nicety, offers any guarantee against the admission into the Thames and the Lea of noxious matters capable of giving rise to zymotic diseases. Advocates of an improved preventive system have only to consider the details of the drainage system which obtains in the majority of small towns and villages, where the sewage is often allowed to collect in cesspits, the overflow from which too frequently communicates with the nearest water-course; and again, the case of street-drains conveying sewage matters into the streams hard by. Here, again, the superiority of the deep-well over the river water is again brought into prominence; for, as we have before argued, the natural filtration undergone by deep-well water in passing through a great thickness of porous strata, renders it extremely improbable that any suspended particles, usually considered to be prejudicial to health, should have escaped removal.

In order to obviate the difficulty which presents itself during the winter months with regard to the frequent turbid condition of the Thames and the Lea, the companies have provided subsiding reservoirs, where the water is stored before it is delivered into the filter-beds. The capacity of these reservoirs is such that, in the case of stormy weather, the works can be carried on for some time without the necessity of obtaining a further supply, and in that way avoid undesirable conditions of the river water. It need not be added that the subsidence which has taken place in these reservoirs, greatly facilitates subsequent filtration. Sir Francis Bolton considers that 540 gallons per square yard of filter bed, or 2½ gallons per square foot per hour, is a sufficient rate for filtration to take place with efficiency. Before leaving the question of filtration, we may with advantage refer to the impression which exists in the minds of a large number of people, that where sand and gravel alone are used in filter beds, the process of filtration is a purely mechanical one, whereas, it is quite as much a chemical operation. Decomposition of organic substances as well as straining are being carried on at the same time. Everybody knows that loose particles of sand and gravel are surrounded by condensed air (oxygen and nitrogen), and when the water comes in contact with so much concentrated oxygen, the organic impurities existing in it are at once seized hold of, and rapidly decomposed. Besides filtration, there is another process, immediately associated with it, which is attended with a considerable reduction of organisms; it is the process introduced by Clark, and which is now obtaining very large attention because of the excellent results which have followed its adoption. It has for its object the softening of water, and consists merely in the addition of a small quantity of slaked lime. Soft water is always required for domestic purposes, and if it is not soft, a large amount of carbonate of soda and soap require to be used in consequence. It has been estimated that the increased expense entailed thereby to the consumer is 80 per cent. greater than if it were done on a large scale by the company. Water obtained from deep wells contains a proportion of solid matter consisting of mineral salts, which render it hard and therefore less suitable for washing and manufacturing purposes. The hardness of the water from the public wells near Liverpool, being nearly 15°, was one of the strongest arguments which Mr. Bateman urged against the suggestion to supply Liverpool by water obtained from subterranean sources. The good results obtained by the use of Clark's process are clearly illustrated in the case of the Colne Valley Company's water, where it is adopted, and which was found to contain only one-third of the amount of solid matter discovered to exist in the water furnished by the Kent Company and by the Tottenham Local Board of Health, although obtained from the same source.

We come now to the consideration of the gelatine method for the discovery of micro-organisms in water. This question obtained a large share of the attention of the members of the Royal Society at their meeting, on June 18th of the present year, when Dr. Frankland introduced the system which he seems to be gradually identifying with his name. Taking a number of small 3 oz. bottles, which, after having been sterilised by submission to a heat of 150° C. for three hours, are kept tightly stoppered, and the water to be examined is then allowed to wash down the outside, when the stopper is removed and replaced immediately the bottle is nearly filled, and the examination of the water is at once proceeded with. Koch was the first to devise the method which has been improved upon, or at least modified, by Dr. Angus Smith and Dr. Frankland. The object is to determine the number of organisms present before and after treatment. A known quantity of water is mixed with sterilised nutritive gelatine, and then poured out upon a glass plate, when, after the expiration of a few days, the "colonies" derived from the individual centres of life can be counted with the assistance of a lens, and from the data thus arrived at the number of organisms present in any volume of water can be deduced. Dr. Frankland obtains his nutritive gelatine in the following way:—One pound of lean meat is finely minced, and after infusion with half a litre of water for one to two hours, is strained off through linen; then, 100 grms. of white French gelatine are soaked in another half-litre of water; to this the extract of meat is added, the whole boiled for a few minutes, when 10 grms. of peptone and 1 grm. of common salt are put in, and afterwards a little carbonate of soda. The addition of the contents of two or three eggs is then beaten up, and the whole being boiled completes the respective operations of reaction, neutralisation, and clarification. Ultimately a yellowish-brown transparent jelly is obtained, which is poured into clean test-tubes, kept tightly plugged with cotton wool, and which are sterilised by straining them for half an hour on three consecutive days. The glass plates, upon which a film of gelatine is to be afterwards placed, are sterilised by heating for three hours to 150° C. The glass dishes destined to receive the plates are placed in a porcelain tray containing a solution which is sufficient to complete the disconnexion of their interior from the outside air, which process effectually prevents the ingress of organisms during incubation. The gelatine in the test tubes is next melted, and then a given number of drops of the water to be examined are introduced with sufficient care and quickness to obviate the possibility of the entrance of organisms from the air, the water and gelatine being well agitated are then quickly poured on the sterilised plate, the conditions of which transference being such as to render the slight exposure to the air of comparatively no moment, and after the gelatine has set, which takes about ten minutes, the dishes are then maintained at a temperature of 20° to 25° C. The process of incubation lasts from three to six days, when the organisms make their appearance, and may be readily detected with the assistance of a lens. A black ground, ruled in squares, enables the counting to be done with considerable facility. The following are the latest results obtained by Dr. Frankland in his examination of the various waters supplied to the metropolis, in which the relative freedom from organic life is arranged in order. It ought to be observed that the number of micro-organisms found at the same time in one centimètre of the unfiltered Thames water was 714, which affords a very striking illustration of the remarkable efficiency of the filtering operations carried out, when this number is compared with the following statement:—

	Organisms per cubic centimètre.
New River	2
West Middlesex	2
Kent	18
Southwark	24
Lambeth	26
Chelsea	34
Grand Junction	40
East London	53

NOTES.

CONSIDERABLE opposition is being organised to the proposed Sewage Disposal Scheme for the Richmond Union. The Duke of Devonshire, a large owner of property at Grove Park, Chiswick, opposite to which it is proposed to establish the Sewage Works at Mortlake, is making preparations to oppose the scheme, while meetings have been held at Kew and Mortlake in opposition to it. An alternative scheme will be submitted by the opponents to the proposed works. This alternative scheme is that of Mr. F. Wentworth Shields, who proposes to convey the sewage by gravitation to a site at Greenford, near the sewage works of North Ealing, and about 3½ miles north of the River Thames. It is argued that this scheme will take the sewage outside of the Union to a rural and thinly-populated district, where land can be had at a low price. It is stated that the Ecclesiastical Commissioners have offered a site there of 507 acres for 150*l.* per acre; and that the scheme is designed to fulfil the following conditions:—The recommendation of the Local Government Board (in their letter to the Thames Valley Main Sewerage Board of 26th of March last) that some scheme of moderate cost for the disposal of the sewage *outside* their district should be adopted; also the recommendation of the Royal Commission on Metropolitan Sewage Discharge (in their Report of 1884) that some process of deposition or precipitation should be used to separate the solid from the liquid portion of the sewage; and that the sewage should be further purified by application to land. The rival scheme is estimated to cost 207,783*l.*, with annual charges representing a rate of 7½d. in the pound. The effluent would be delivered into the river Brent, which runs by the southern side of the proposed sewage works site, and which ultimately discharges into the Thames five miles above Teddington Lock. The Richmond Vestry have intimated their determination to proceed with their Mortlake scheme, and a Local Government Board inquiry will be held shortly to consider the matter.

IN reference to the maintenance of the former site of St. Paul's School as an open space, Mr. Ewan Christian writes to the *Times* of Thursday to urge the importance of not letting this opportunity slip of securing open ground near the east end of St. Paul's Cathedral. Mr. Christian observes:—

"Even if no more could be done than the surrendering of the school site as an open paved space, that would be very valuable; but the whole area down to Watling-street is now clear, and long may it remain so. And would it be too much to expect, if these plots were saved, that ultimately the whole block between St. Paul's-churchyard and Old Change might be thrown in? Then, indeed, London might be said to have done its duty.

I say nothing of cost, or of the duty of the premier City Company to whom the land belongs; but surely in the richest city in the world that ought not to be matter for consideration in comparison with the care which it should exercise in regard to its noblest monument. Probably in no city in the world is there a more glorious architectural view than that from Fleet-street of the western front of its grand cathedral. Is it too much to hope that something may now be done for the view,—less important

it is true, but still very beautiful,—of its eastern end?"

What we have said from the first is that the architectural gain would be immense, and worth paying very highly for, if in securing the site of St. Paul's School we were also securing the commencement of a general ultimate clearance of the ground at the east end of the cathedral, and this Mr. Christian seems also to contemplate. Without that general clearance the mere securing of the St. Paul's School site would do little or nothing for the view of the cathedral from the east; it would only afford opportunity for widening a cramped thoroughfare. The proposed scheme must be regarded as part of a larger one, or it is barely worth what it will cost.

THE Hon. Secretaries of the Competitions Committee of the Institute of British Architects (Messrs. Cole A. Adams and Aston Webb) have sent a circular to their local hon. secretaries, asking for the names and addresses of "Mayors, Town Clerks, Borough Surveyors, and other public functionaries" of their respective districts to whom they may send a circular, stating the objects of the Committee, so that its recommendations may be brought before the promoters of public competitions in the initial stage of a competition. The circular proposed to be sent to such functionaries emphasises the following points: that the knowledge and skill of a specialist are necessary to weigh the merits of the various designs, especially in regard to cost, observation of the conditions, and practical appropriateness; that a great number of architects are now pledged not to compete unless a professional assessor is appointed; that promoters would find great advantage in securing the services of the professional assessor from the first in assisting to draw up the conditions; that the selection of the assessor should be determined by the nature of the competition, "the object being to obtain the services of men most conversant with the requirements of the class of building contemplated." These are all very important points, and it is to be hoped that they will receive due consideration from those to whom the recommendations of the Committee may be addressed. It would be exceedingly desirable, we may observe, to have the help of a professional adviser in drawing up the conditions of a competition; we see very few such documents which are not exceedingly deficient in clearness and practical completeness in their method of stating the requirements. The Committee does not offer to advise on the selection of an assessor, referring on that point to the President and Council of the Institute of Architects, or to any well-known architect of established reputation (not necessarily a member of the Institute of Architects) who is not a competitor. The Committee does not express any opinion on the competition system; only that if it is to exist, it should be under such conditions as are suggested.

LIEUT.-COL. JONES and Mr. Bailey Denton have forwarded to us a letter, which they have addressed to each individual member of the Metropolitan Board of Works, in reference to what may be termed their "Canvey Island scheme" for dealing with the sewage of London, to which we referred some time since in a "Note." We have not space to print the letter, but the substance of it is that the scheme of the writers has been shelved without the reference to any independent and competent authority which they asked for; that there exist special properties and conditions appertaining to Canvey Island which render it the best and cheapest site for dealing with the sewage of London, and that it can be purchased for a cost which will only charge the ratepayers with half a farthing in the pound; that whereas the Board of Works have offered 500*l.* for the best design for a steamer to take out to sea 1,000 tons of "settled" sludge daily, the cost of an inquiry into Col. Jones and Mr. Denton's scheme would not involve half that outlay; which is very likely true. We have our doubts about the Canvey Island scheme, but we should like to see a formal inquiry into it. The promoters or inventors of it point out that the steamer capable of carrying away 1,000 tons of sludge is only dealing with one-sixth part of the daily deposit; but that is wide of the mark: the Board offered their premium for a design for a steamer of the kind and capacity described. They never proposed, having obtained their model steamer, to confine themselves to building one only of the pattern: they might build a score.

THE Simplon tunnel, which will very shortly be commenced, is another, and the most formidable of the gigantic railway connexions undertaken of late years to facilitate the communications between Italy and the rest of Europe; and the project suggests a comparative note on the existing Alpine tunnels. At the present time the Alps are pierced by three remarkably long tunnels, entering Italy from France, Switzerland, and the Austrian Tyrol respectively, and called, according to the mountain chains that are traversed, the Mont Cenis, St. Gothard, and Arlberg tunnels. Of these, the Mont Cenis, which connects Chambéry with Turin, is seven miles and three-quarters in length and between 3,000 ft. and 4,000 ft. above the sea. Its cost was 75,000,000 francs. The St. Gothard tunnel, which connects Lucerne directly with Lakes Maggiore and Como and so to Milan, is nine miles and a quarter in length, and cost 57,000,000 francs, the diminution in expense being owing partly to the softer strata, but principally to the more rapid progress of the work by improvements in the drilling machines. The Arlberg tunnel is shorter than either Mont Cenis or St. Gothard, being only six miles and a half, although its summit level is nearly 1,000 ft. higher. By this tunnel a communication is given between Innspruck in the Austrian Tyrol and Zurich. The last and most formidable rival will be the Simplon tunnel, by which the existing line from Geneva to Martigni and Brieg will be carried through the mountain to Domo d'Ossola and so on to Pallanza or Stresa on the Lago Maggiore. As this tunnel will be commenced at a much lower level than any of the others, it will necessarily be longer, the rough estimate being twenty kilomètres or twelve miles and a half, and the estimated cost somewhere about 100,000,000 francs. The difficulties of ventilating so long a tunnel, which were once thought insuperable, have been pretty well disposed of by the experiences of St. Gothard, which is lighted by lamps placed at intervals of 1,150 yards; and, although the temperature is certainly somewhat high (about 75° Fahr.), the traveller feels no discomfort, while the freedom from smoke is far greater than in the shorter tunnels. There are fifty-six of these latter, extending over an aggregate of twenty-five miles, and some of them are so peculiarly spiral that the traveller performs an unconscious corkscrew course underground, emerging in an entirely opposite part of the defile to that at which he entered.

THE experiments which Admiral Selwyn is conducting in Middle Scotland-yard should be known to all those who are interested in steam navigation. The Admiral has set up a marine boiler on a piece of waste ground, and is ready to exhibit his results to those who pay a visit to the spot. He uses a combination of steam and oil. It is in this manner that those important results have been obtained from petroleum refuse, which bid fair to effect a revolution in marine warfare, and to some extent in commercial navigation. But the best of the matter as it comes from the hands of Admiral Selwyn, who has been for fifteen years at work upon it, is, that the material from which the oil that he uses is made is all to be obtained within our own shores. We cannot, of course, be expected either to check or to verify the statements made of the large pecuniary saving to be effected in steam navigation by Admiral Selwyn's discoveries. But we can have no hesitation in saying to all persons concerned in the economy of steam-power, "Go and see for yourselves."

SOME members of Lincoln's Inn and others have drawn up a petition against any further demolition of Gate House-court (or Old Buildings), including Sir Thomas Lovel's gateway of 1518. At a largely-attended meeting of the Society of Antiquaries on Thursday night, the 10th inst., this petition was signed by the President, by direction of the Society, and by all the other members present, including the Earl of Crawford, Messrs. Boord, Franks, Freshfield, Martin, Parker, Wheatley, &c. Being couched in a style more original and piquant than is customary with such protests, the petition was heard with much interest and amusement. After indicating the historical associations of the remaining chambers, the signatories point out that Old Buildings (or Square) has never suffered from the numerous fires that broke out from time to time in the Inn; and notably in New-square, considerably its junior in years. This immunity is ascribed to the employment of oak for all the timber work. The portions just demolished plainly showed how substantial was their construction.

THE subsidence in the Metropolitan Railway tunnel, and thence in the portion of Euston-road immediately over it, between King's-cross and Gower-street, is too serious a matter to be made light of; but the report of the engineers to the company seems conclusive to the effect that there is no actual or immediate danger to be apprehended. There seems no doubt that the subsidence has arisen from the clay foundations of the tunnel walls becoming saturated with moisture,—from what source does not seem clear as yet,—and from the pressure on the bed of clay exercised by the recent buildings for the Midland Railway Goods Department in the neighbourhood. The engineers of the railway charge the accession of moisture on the leakage of "the parish sewer," which is, at all events, a not impossible explanation. A concrete invert which has been built beneath the tunnel, is now nearly completed; and this will probably put an end to further subsidence. "Constant observation," the engineers add, "has shown that no movement has taken place since these works were commenced."

WE learn that it is proposed to form a club for men engaged in the study and practice of architecture and the fine arts and engineering, the club being apparently, from the terms of the circular forwarded to us, intended specially for the junior members of the three professions. We rather doubt the amalgamation of engineers with architects and artists for a club of this kind; engineers and artists do not tend to "mix," as a rule, though perhaps it would be better for both if they did. As the promoters of the club refer to "the facilities which it will afford to members residing in the country by placing at their disposal accommodation for business transactions with clients," we presume the objects of the proposed club are as much practical as social.

FAIR progress is being made with the addition to the Patent Office Library in Southampton-buildings. This was originally built over a portion of the rooms on the first floor until lately occupied by the Chancery Registrars. When completed eastwards the enlarged Library will cover the whole of that floor. The increased accommodation should prove of considerable convenience to patent agents, inventors, and others, many of whom probably remember the old state of things when all the reference-books were piled up in a long dark passage below.

SOME few months ago, the antiquarian world at Rome was greatly interested by the discovery of a mausoleum outside the Porta Salaria, in the grounds of a Signor Bertone, who has been most active in clearing it out and exposing it to the light of day. It proves to be a mausoleum of great size, larger than the one to Cecilia Metella, near the Porta St. Sebastiano. An inscription has been found very recently, which tells us that it was built

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by Marcus Lucinius Petus, a prefect of horse, for his sister Lucinia and himself; and it is hoped that fresh excavations will reveal the sepulchral chamber and the bodies of the inmates. What gives rise to this hope is the fact that a columbarium has been discovered intact near the mausoleum, and there is every reason to suppose that no disturbance of the ground has taken place since that date. The whole of this district, which forms a triangle bounded by the Via Pinciani, Via Salaria, and the city walls, abounds with antiquarian remains, one of the latest finds being a marble plate on which was engraved an edict relating to the building and situation of storehouses.

THE biennial supper in which the students of the Royal Academy are in the habit of indulging after their efforts in the competitions for medals or prizes (which competitions, by the bye, seem to increase in number almost yearly), took place at Willis's Rooms on Monday night. Sir Frederick Leighton and many of the Academicians were present, and the hall was well filled with students and their friends. The architectural profession had the honour of providing the chairman on this occasion in the person of Mr. Leonard Stokes, and had reason to be well satisfied with their genial representative.

BARON HUDDLESTON has again delivered judgment against the ventilation of the Law Courts, having stated on Wednesday that Court No. VI. was no longer tenable for him, and Court No. III. being empty, adjournment was made to that. The complaint does not seem to be that there is too little, but too much ventilation, or at least that it is accompanied by "draughts of cold air." The engineer, according to the reports in Thursday's papers, had assured the learned Judge that, owing to the peculiar construction of Courts VI. and VII., it was impossible to prevent the mischief there. We fear there is considerable room for complaint about the practical arrangements of our Temple of the Law; but at the same time, as it appears to be always the same learned Judge who complains, we may perhaps assume that he is specially sensitive to draughts,—a matter in which individuals differ very much.

THE FULHAM VESTRY-HALL COMPETITION.

THE bewildering display of designs now exhibiting in the Chapel Ward of the Fulham Infirmary has resulted from the invitation of the Fulham Vestry for plans for their proposed Vestry-hall. Sixty-three architects have responded to the call, and some of them have sent duplicate sets, to show an alternative treatment of the problem. So that nearly four hundred elaborate drawings have been furnished for the selection of the committee and its advisers.

This is a case in which sketch plans might reasonably have been asked for in the first place; for the site is very irregular, and the first thing to be settled is the principle upon which the various buildings,—and more especially the large hall and vestry-hall,—shall be disposed. The axis of the rear portion of the site forms an obtuse angle with a central line at right angles to the main frontage in the Fulham-road, and the utmost ingenuity has been displayed in concealing the awkwardness of the junction of the rearward portion of the structure with the front block.

The designs range themselves under the following heads:—(*a*) Those which on plan have all their lines perpendicular to the main frontage, the several apartments running on to the margin of the site as they may, their abuttals being variously canted off or rounded so as to avoid the acute angles which would otherwise result from this system of plan.

(*b*) Those which endeavour, by providing a circle, octagon, or other regular figure, at the head of the axial line, to disguise the fact or mitigate the defect.

(*c*) Those which virtually detach the rear building, and occupy the triangle between its front and the rear of the main block by an open court or courts.

The large hall is, as may be supposed, variously placed by different competitors. If at the back, and ranged parallel to one or other of the sides of the plot, its access is more or less difficult. If, as some prefer it, it occupies the first floor of the front block, the lighting of the rooms, halls, corridors, &c., which underlie so large an area, suffers. There are many inherent difficulties which would try the skill of the most expert contriver, and everything points to the desirability of first agreeing upon the principle of the relation of the main apartments before passing to the consideration of the details of the plan or the style of the elevation; it cannot, therefore, but be a matter of regret that this course was not taken, to the saving of much fruitless labour and no inconsiderable expense, and very considerable disappointment.

The difficulties of the problem have been further aggravated by the insufficiency of the funds allotted for the work, supposing that anything more than a mere building is desired. This part of the affair the perplexed competitors have dealt with variously; some have boldly ignored the condition altogether, relying upon the captivating influence of their designs to overrule the inconvenient restriction. Others have made strenuous efforts to bring their scheme down to the level imposed, and have produced results which will, it is feared, stand no chance beside their handsome rivals.

Others, again, have perforce resorted to that lowest of all expedients, the provision of a mere barn of a building hiding away behind a veneer of a "façade." It would almost appear as though some fatality attached to vestry-hall architecture, which the future historian of styles will inevitably describe under the head of "Pretentious Palladian."

Without adopting any classification of the designs, and taking them *seriatim* as they appear on the screens, we have noted the following points:—In "Suivez Raison" the inconvenience of the broken axis is almost surmounted by the provision of a transverse corridor, called on the plan a municipal hall, handsomely lighted by bowed ends, and joined on to the front building by a flat curve in the middle of its length. On the ground-floor the several offices open out of a central corridor, and the large hall is placed over them at the rear. As is the case generally with this exhibition, an unusual amount of thought has been expended upon the planning, and the exercise it has afforded cannot be altogether unprofitable. The elevation is of a simple Palladian type.

In "1885" the rearward buildings are at right angles to the main frontage. The Vestry-hall is at the further extremity of a corridor more than 100 ft. long, lighted almost exclusively by borrowed lights. [Mem. There is another design with this "motto."] The author submits two elevations,—one Gothic and one Palladian,—which is in itself an unconscious satire upon his plan.

"Ionic" has an ingenious plan: the large hall running along one side of the rearward land; the main entrance being at one extremity of the Fulham-road frontage, a central entrance being provided for the offices. The site is so fully occupied that part of the building would, we fear, be but indifferently lighted. The style is a somewhat massive but not unpleasing Palladian.

"Each Bird its Nest esteemeth best," is noticeable for two things, to wit,—a complete absence of attempt at ornamental planning, and a statement in the memorandum accompanying the design that a good bold effect has been sought in projections, whereas, in fact, the principal front is an almost unbroken plane.

"Ars et Labor" sends a well-designed and well-drawn scheme. The planning throughout is of a superior order,—the junction of the two blocks of building cleverly met, and the elevation, if of a somewhat obsolete character,—the principal order running through more than one story,—is stately.

"Ecce Signum" is the motto of another well-drawn design, the buildings covering the whole site. The elevation a reticent Anglo-Italian not out of keeping with the object.

"Central" employs a circular hall at the head of the axial line of his plan; the whole is arranged with much care and skill, and many of the interior effects would be charming. The style is a quiet French Renaissance with high roofs and dormers,—some too large and out of scale. Two carefully-drawn sheets of detail show this architect to be a competent designer, whose work would be in every way of creditable quality.

"Octagon" has adopted a similar expedient with a difference. His public hall has a semi-circular end, and is approached through an irregular octagon. The style is French Renaissance, skilfully treated.

"Red Cross" sends an Italian Renaissance design, with an elaborate louvre surmounting a high-pitched roof, and, by way of showing how thoroughly he has "felt his part," he has given large-scale sections of Buchan's trap for intercepting the drainage of the building and ventilating the sewers.

"Semper Paratus" sends a Gothic design in which there are some good points, which suffer somewhat from a rather weak form of draughtsmanship. The entrances and staircase halls absorb an enormous proportion of the site. An alternative design is not quite so satisfactory.

"B.'s" design is remarkable for the uncompromising plainness of the rearward buildings.

"Compact" enters his large hall through a canted end,—another instance of the ingenuity which this problem has called out. The elevation is late Tudor or Stuart, not ineffective, and which would probably look better in execution than upon paper.

"Faith."—A very florid Italian design, quite outside the prescribed sum, even if it were suitable, which it is not. What have mermaids and cherubs and winged horses and satyrs, and we know not what fabulous animals besides, to do with grave vestrymen? It is a lively design, certainly, but surely *mal à propos*.

"Montgomery's" plans are unfortunately separated from his elevations. It is a straightforward design with an artistic elevation.

"R.I.B.A." sends a Flemish Gothic design, with high roofs, double dormers, and angle spirelets, more satisfactory than the alternative design in attenuated Palladian.

"Utility" gives the cubic contents of his scheme, which would show a probable cost of 16,000*l*.

"By Help of Square and Compasses" is the motto of a somewhat heavy Palladian design, not too pure in detail. No attempt at handsome planning has been made.

"Light and Air" is seen at a glance to be one of the best designs in the room; stately in plan and picturesque in elevation, and not too free Classic, well proportioned, and well drawn. The upper wings of the central block are a little lacking in interest, and if the interior of the hall is to be as has been designed, the Vestry must dip a little deeper into their pockets, we fear.

"Donnez-moi" is to be commended for the cheerful naïveté of his motto; a merit he shares with "Wisdom, Strength, and Beauty."

"Bee" has an enormous entrance-hall, which would not be altogether an advantage. No plan, however, could stand the weight of so indifferent an elevation. The speculating-builder variety of Queen Anne is, we take it, the lowest form of contemporary art.

"François I."—A remarkably palatial plan, full of striking interior effects, but too costly, we fear, for the purpose. The exterior is full of fancy, but is not quite equal in merit to the plan.

"Stet" accompanies his plans by very satisfactory and well-drawn elevations, French Renaissance in style.

"Let Fulham prosper" provides a well-drawn set of plans with the hall placed in the centre of the main frontage, and running at right angles thereto. The façade is elaborate, the real building which it conceals quite mean. An alternative plan has a much superior elevation.

"Order."—A Georgian design in brick and stone, high tiled roofs, and dormers; the rear elevations in grey stock with red quoins, &c. The whole well proportioned and detailed, and, in our opinion, suited to the occasion. A quiet, honest structure, which really reflects the architecture of the day. It strikes the happy mean between meretricious display and sordid ugliness, and has the virtue of being consistently designed throughout, — a virtue nowadays rather rare.

"Ripley."—We can think of no single epithet which would describe this most original design. It is undoubtedly clever, although its appropriateness may well be doubted. A central lofty tower is crowned with battlements at the foot of a steep roof, and, lower down, is broken into semi-elliptical side turrets with a kind of machicoulis arch between them, — a strange design, full of somewhat irrelevant merits.

"Suitability" might, perhaps, justify the motto as to plan, but we cannot admire the elevation, a Free Italian with terra-cotta or stone vases on parapets and Mac Farlane & Co. on the ridges.

"The Mikado" has inclined his rear building at an angle so great as to be parallel with the side of the ground, and has furnished a plan which, without being unduly extravagant, would prove not unsuitable. The elevations are in a French Renaissance with circular angle turrets and a large louvre on the highest roof. The whole is picturesquely and informally grouped.

"Sigma" gives an elliptical form to the entrance end of the large hall, which is a novel treatment, and sends elevations in a sort of aristocratic variety of the School Board manner, effective and not unsuitable for a parish building.

"Avis" sends a bold and original design, recalling certain French examples with a mixture of English Renaissance. Of the companion turrets closing the main façade, one is covered with a spirelet and the other has a flat roof, almost the only departure from a symmetrical scheme. The elevation has the advantage of clearly expressing the great hall, a very pleasing design.

"Experientia" is a clever Anglo-Dutch design, with an enormous central gable, broken into curves and volutes, and filled up with shallow pilasters and panels *à la mode*. There are reminiscences of Norman Shaw, Ernest George, and others about it, and it has many of the merits and all the defects of those artists.

"Red Star," a vigorous Gothic design, after the manner with which Mr. Brooks has familiarised us. The large hall is in this plan entered at the side.

"Beta" has an effectively-grouped French Renaissance design, though somewhat weak in detail.

"Argus."—Another Anglo-Dutch elevation in its way. The plan is a little extravagant in the matter of halls, &c.

"Wa la Galibilla Allah."—The gentleman who has chosen this astounding motto has not scrupled to give up the whole of the main frontage on the ground-floor to an entrance-hall and two side staircases.

"Ad Rem" makes one of the most ingenious attempts to overcome the break in the line of axis by the interposition of a curved slanted vestibule.

"Adelaide" has a large walled octagon hall on the first floor, which is only expressed below by slender iron columns,—a fault in construction which will be sure to tell against his chance of success.

The remaining plans are not mentioned separately because they do not possess special features, and not because they are without merit. It has, indeed, rarely been our duty to inspect a collection of designs in which the average level of merit has been so high, or the residue of indifferent work so small. It will be a difficult matter, all things considered, to award the palm; for the best designs will prove, we fear, too costly, and the designs which could be carried out for the stipulated sum will fail to please.

ENGLISH IMPRESSIONS OF AMERICAN ARCHITECTURE.*

THAT we judge others by ourselves is true, perhaps, of architects as much as of any other class of men, and it is not an unnatural thing that the work of others should be measured by comparison with our own, as the latter, whatever its merit or otherwise, is probably the most familiar scale by which we can try the merits or demerits of other things, and hence I shall, to a large extent, compare America with our own country. In attempting to fairly judge American architecture at the present day, it is needful, perhaps even to a greater extent than with us, to consider the various phases through which it has passed, and a criticism which was written in 1853 strikes very close to the root of the matter. Speaking of an exhibition which was projected about the time of our 1851 Exhibition, and took place in New York in 1853, the criticism mentioned says:—

"America is a new country: the energies of its people have all been unceasingly directed to progress. It has had, therefore, the disadvantage consequent on all this, of a want of experience in the finer qualifications of art study, which belongs to the Old World and its older institutions. It is no discredit to our Transatlantic brethren that this is the case. They have had other things to do, and well have they done them! They have had a vast territory to reclaim from savage life, a vast government to organise, a vast commercial system to ripen to maturity. They have done this work so thoroughly and well that they have good reason to congratulate themselves and their country upon the position they hold in the world. Having effected all that commerce may require and prosperity achieve, the fine arts will doubtless obtain a greater share of attention, without which they cannot attain maturity. Such thoughtful works as we see in the Old World may be designed in the New, but not without 'the appliances and means to boot' which they have had from their cradle in Europe."

Again, the opinion expressed by a well-known architectural critic points to the same fact, but puts it, perhaps, less sympathetically, and looks with less clearness of foresight over the ten or twelve years which have passed since its publication. The words are:—

"An American has a great deal too much to do, and is always in too great a hurry to do it, ever to submit to the long, patient study and discipline requisite to master any one style of architecture permanently. Still less is he likely to submit to that amount of self-negation which is indispensable if a man would attempt to be original. Why should he stop to design each detail to the place it is intended to occupy? Why should he try to proportion every part harmoniously, or to apply each ornament appropriately? Why submit to all this drudgery, when Classic pillars and Gothic pinnacles stuck on *ad libitum* get over all difficulties and satisfy himself and his employers? The perfection of art, in an American's eyes, would be attained by the invention of a self-acting machine, which should produce plans of cities and designs for Gothic churches or Classic municipal buildings, at so much per foot super., and so save all trouble and thought."*

We have here two opinions upon American art,—one is the hopeful view which now bids fair to be realised; the other is the somewhat cynical view of a great critic, who in his criticism rather overlooked, I think, the possibilities of the then immediate future.

Let us glance briefly at the historical aspect of the subject, noting first that we have now to deal, not with the Spanish types of architecture and of race which prevail in Mexico and South America, but only with the works of the Anglo-Saxon race which overran the Northern part of the Continent; in other words, we are concerned now with the United States, and, to limit it even more closely, it should be stated that at the present time, though to a diminished extent, the architectural work of the Eastern States on or near the Atlantic shows more merit than that inland—with the exception of such cities as Chicago, for instance, which, however, is comparatively far West. This comparison is to be noticed in artistic work rather than in construction, which is only natural, seeing that as national progress has gone forward each city further West has in turn had to fight with nature for a place and for prosperity.

The national elements, therefore, with which we have to do to-night are the Dutch and the English.

Prior to the year 1576, Spain had long overrun Mexico and Peru, and daring English fishermen had visited Newfoundland. At or about the year named, English adventurers attempted to colonise different portions north of Boston. An expedition sent by Sir Walter Raleigh named and partly explored Virginia, but the first permanent settlement under John Smith kept its foothold in Virginia from about 1606. Then in 1620 the historic *Mayflower* landed the pilgrim fathers in Plymouth, Mass. From this time matters at varying pace progressed steadily; rapid growth followed by the emigration of thousands of Puritans from Charles I.'s persecution in England. From these two centres the colonies grew and gradually touched. New York by the war with Holland passed with its Dutch colonists into English hands. Penn emigrated to Pennsylvania; other districts were opened up by other men, and gradually, partly by climatic influence, partly through custom (inherited from old English aristocratic families) and the influence of slavery, the South with Virginia separated in tastes and type from the North. The architectural elements (the Dutch element round New York and the English in other parts) from the beginning each worked at first chiefly in the fashion prevalent in its old home, but had little time in the press and trial of securing its position to think of architectural developments. So it came to pass that, when firmly established, the new nation after the War of Independence (hindered, however, again by the war of North and South), gradually found time for artistic work, and after a period of artistic depression before the comparatively recent revivals worse perhaps than ours, bids fair now to have a place of its own in the architecture of the world, and that place by no means a humble one.

Taken as we take it here, the phrase "examples of old work" has but little meaning in America,—at all events, in an indigenous form. There was, we may safely assume, from what we know of history, a time in the early colony days, when good work was done in a quiet, homely way, which has a charm for those who appreciate in a building the simple expression of purpose. Dotted here and there, in a wide radius around Boston, particularly are many examples of work dating from that time. The forms current upon this side of the Atlnntic at the time are found on the other, treated in a manner often quite its own. They show a close connexion, and a considerable unity of thought and feeling between the mother country and what was then her colony. In a recent number of an American monthly magazine we find the following:—

"There was a distant time when building as a fine art was in our country the rule and not merely the exception. While our fathers were colonists or very young republicans they built very well,—sometimes beautifully, and almost always honestly, intelligently, appropriately, and with a simplicity of aim and manner that was the very reverse of affectation or vulgarity. But the years which lie between their times and ours were dead indeed to art,—were characterised at first by a helpless sort of ignorance, and later on by crass vulgarity and barbarous display."

The outbreak of the War of Independence must have cut the tie that bound her art to ours, and left her to seek for guidance elsewhere. The result was a long period of blind groping after light leading up to the beginning of this century with its revival of Greek forms, followed by the various phases through which we ourselves have passed, the Gothic revival with its various ramifications, French, Venetian, &c., and even Queen Anne. In all these different fashions, however, there has always in American work been a more or less defined character.

The Gothic revival did not find the same enthusiastic reception among our brethren as it did here. Types less usual with us found most favour there, and were in some cases not so conscientiously carried out, or, shall I say, so thoroughly understood as with us. The Queen Anne work, there shown in fewer examples, and those of a less eccentric type, follows suit. In fact, what a recent writer says of the Queen Anne work there applies equally well to all the fashions (perhaps it is an uncharitable word) which had their origin here and their repetition there.

The words used are these:—

"All these successive phases in English work were imitated here in more or less faithful and more or less successful ways. As to the Greek fashion, it reigned for a time as wholly as it did in England, though with variations due to our lesser wealth and our different materials. The Gothic movement, however, was not quite so cordially endorsed on this side of the water as upon the other. English Gothic forms found little favour except for ecclesiastical and collegiate work."

The French influence which I have already mentioned is also a noticeable feature in their work, much of the French verve and refinement of manner crops out in the detail of their buildings, and coupled with the sturdy directness, so to speak, of the English feeling, has produced a result which is in many cases an advance upon the characteristics of both the constituent elements.

That better technical education means better architecture is a truism for which it would be necessary to apologise, were it not that I think we have something to learn from the Americans in this direction, and a few words on this may not be out of place.

Here in England, though we have much to be proud of in our modern architecture, it is very possible that, unless we pay more attention to this point, our architectural brethren on the other side of the Atlantic may outrun us,

* A paper read before the Leeds and Yorkshire Architectural Society on the 23rd of November, 1885, by Mr. A. J. Gale, A.R.I.B.A., first holder of the Godwin Bursary.

* "History of the Modern Styles of Architecture," p. 499.

notwithstanding our European advantages of study.

I believe I am correct in stating that the system of pupilage is practically unknown as we have it here. Young men *there*, taking the average architectural beginner, as to length of pocket and social standing, have, up to the point of their entering the profession, a wider education and one more complete, though perhaps not of better quality were it as short as ours.

They more often go to college, and are at the end of even a somewhat short college course better able to appreciate what is put before them as architectural pabulum than if coming straight from school.

Architects in America are much indebted to Professor Ware, now of New York (late of Boston), for the unceasing interest he has taken in professional education, to which he has of recent years, as Professor, first at the Massachusetts Institute of Technicology in Boston, and latterly at Columbia College, New York, contributed largely.

Young men, after spending a year or two in an office subsequently to their college career, or some such preparation between school and office, have in many cases spent periods varying from six months to two years or more at one of the institutions named above.

The range of subjects taught is considerable, and I have gathered from conversation with both professor and students that it is efficient, and appreciated when its results are used in actual work.

There is much advantage in a course of education which provides, first, on entering the profession, better general knowledge than that of the average school-boy; secondly, some experience of an office before theory undiluted with practice is attacked; and thirdly, an architectural collegiate course, just at the time when its practical bearings can best be appreciated.

The above may be taken as fairly typical of the student whose education does not include, at all events till much later on, a visit to that goal of American students of all kinds, Europe, with its Old-World knowledge, and its artistic wealth of all ages.

Professor Ware's efforts have been mainly directed to bringing to the American students,—to their very doors, as it were,—the information and atmosphere of thought of the Old World. To this end he has twice at intervals spent a considerable time in Europe, travelling both in the North and South, and obtaining books, casts, drawings, and other helps to study.

The result of this and of a careful investigation of methods prevailing in professional study, here and elsewhere, has been the building up, first in Boston and now in New York, of schools which give a capital education at no very great cost, and one to which the student can, and indeed must, devote his daytime rather than simply his spare evening time.

The payment of value for work done in all grades of the scale of assistants enables many to lay by the necessary funds for a shorter or longer architectural college course; and thus if he cannot afford to leave his own country, a student may at all events approach very near to making up the deficiency.

Travelling studentships are, if not very numerous, at all events well worth holding, and, without attempting to give a list, the Rotch Studentship for European travel is intended to assist students to study for two years in Europe. The conditions are liberal, the examination by which it is obtained a real test, and the benefit certainly very great.

The comparatively large number of men who come to Paris to study at the École des Beaux Arts shows the estimation in which European study is held, and it shows also the fact that, as between England and France, the latter is chosen because of its facilities for a systematic course of study, such as we cannot boast of here. South Kensington's elaborate machinery does not seem to meet the case, and other systems are conspicuous by their absence. It surely is not because we do not need something of the kind.

Put briefly, in both nations there is no lack of energy, as well as talent, but the American, we may surely say, has found out that something more is required than apprenticeship to a good office for three, four, or five years after leaving school, even though this be supplemented by a vigorous course of evening study, private or associated with others.

Even in the matter of a visit to Italy, to take one country as an example, the study of the works of the ancients is, in proportion to their numbers and accessibility, far more general among American architects than it is with us, near as we are.

Turning, for a general view of American work, to the cities, as more indicative of a nation's architecture than the lesser towns, a peculiarity very noticeable to an Englishman's eye is found in the prevalence of rectangular setting out of the streets.

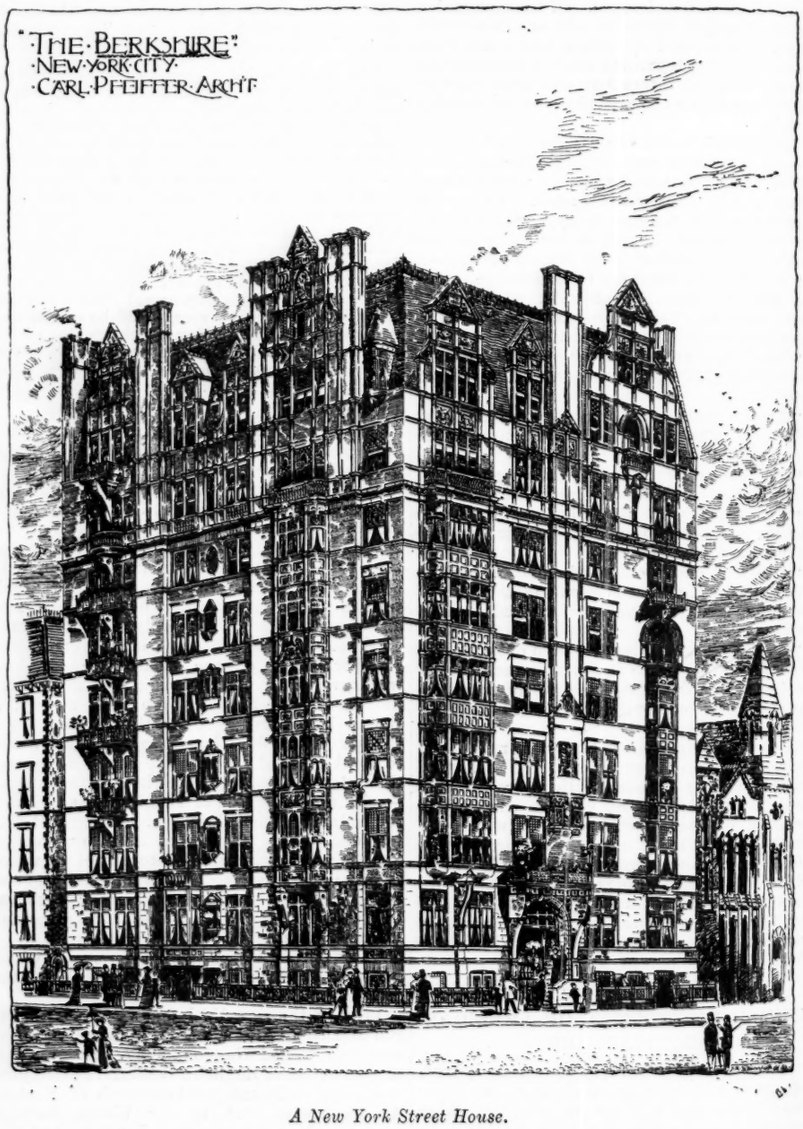
I do not think this to be so greatly a disadvantage, even from an *extreme* artistic point of view (if we may so speak), as is frequently urged; indeed, only the other day a letter appeared in a professional journal, deprecating the abolition of the straight symmetrical rectilinear completeness of one of our main London streets, on the ground of the loss in impressiveness which results. Perhaps it may be urged that there are fashions, even in fundamental laws of taste, such as this, and there is much to support the view that in a Renaissance-loving epoch, such as we live in now, symmetrical balanced groupings are likely to prevail. Yet it may surely be maintained that, even in general effect of grouping, there is much to recommend a plan, rectangular in its general distribution of main lines, broken up suitably, let us say, at corners, with forms calculated to afford relief to the bareness of straight lines.

My own observation, in America, the home of this system, leads me to say this, and to venture the opinion that with due regard to the balance and breaking up of masses, street architecture should not, and, properly treated, does not, suffer in effect by being placed in such circumstances. The gain in convenience of plan is great, and the opportunity of treating a building, in its masses as well as general detail, with a freedom of touch which will overcome the bareness of a too rigid symmetry, are by no means small.

Passing in review the more prominent of those cities which I visited, it will be seen from an inspection of the plans which are exhibited that New York, Philadelphia, Baltimore, and Washington and Chicago are chiefly planned upon the rectangular principle.

Boston is chiefly planned or rather has grown up on the opposite method.

The order in which I have named them is that in which they were visited, and, I am inclined to think, that had there been (from rectangularity) in the buildings of the former so great an absence of architectural fitness and suitability as seems to be sometimes thought it must have struck the eye of even a very casual observer, when followed by a visit to Boston.



A New York Street House.

On the contrary one of the chief points that struck me in Boston was the difficulty with which a building could be appreciated, owing partly to the narrowness of many of the streets and even more to the crookedness of them.

Another point which impressed me while on this question may be noticed. A glance at the plans of the cities referred to will show that, putting Boston aside as almost entirely an irregular-shaped city, the remainder have all some point or points at which a main thoroughfare cuts diagonally across streets otherwise regular in plan. It is to my mind precisely at these points that American street architecture appears at a disadvantage, while I can call to mind numerous instances in which a good use of rectangular surroundings has resulted in a pleasing effect.

In New York, Broadway cuts diagonally across the city, and in Philadelphia, Baltimore, and Chicago similar instances occur. Washington

is a law unto itself, and in addition to several diagonal streets, all planned with a certain adherence to symmetry of effect, it has an almost unique effect in the converging lines of its fine avenues all meeting at the capital.

It is to be remembered in judging this question that architecture in its highest sense hardly means mere prettiness, that picturesque detail while infinitely precious in some of the most charming works of antiquity, is a good servant but a bad master, and that some of our most successful buildings, viewed from an artistic standpoint, are those which, in spite of their symmetry (to use a too common phrase) command our respect and admiration.

As the Continental critic, Carl Vosmaer, says in his novel, "The Amazon":—

"If the eye is sufficiently trained and cultivated to be open to things not merely pleasing; if we acknowledge that the beauty of architecture does not by any means consist in the accessories, in profusion of ornament, in the childish toywork of fantastic moulding and carving, but in the proportion of great and small, of principal and subordinate forms, of straight and curved, of horizontal and vertical lines; if, in short, we know that it is mathematics become poetry, then alone can we possess a true feeling for architecture,—then alone we learn to delight in it."

The general aspect of the cities is, when weighed in the architectural balance, found wanting in effect when compared with ours. There is, however, more open space, as a rule, and more fairplay is given to their buildings in the way of a chance to be seen. As a rule, more restraint characterises American city buildings, a restraint which, a few years ago, often expressed itself, it must be admitted, in very ugly forms, and frequently does so still. Compare, however, the majority of our works with the majority of theirs, and it will soon be seen that both have much that can be improved, and that it is the few that are really works of art and not the many.

American work is, moreover, much helped by the tastefulness in general grouping which distinguishes the public monuments. There is a general attention to grouping in these which stamps them at once as the result of thoughtful work. The only work of the kind which I have seen to compare favourably with them is that of some French monuments, and I think there can be little doubt that this good feature is the result of the influence, not, I fear, of England, but of France. American sculpture is and has been, as is frequently noticed, carving out for itself a peculiar path of its own, and the quality above referred to is closely allied to the forcible nervous work seen in their sculpture.

One of the finest pieces of what may be called perhaps monumental grouping is to be seen in the new Public Buildings in Philadelphia, situated as they are at the junction of four wide streets in the centre of a large open square. These squares abound in the cities, and they are generally well planted with trees, and form pleasing features.

There is no doubt that while paying the just tribute of praise to American architectural talent, as it at present stands exemplified in recent buildings, one must admit the poor character of much of the work still standing, and in some cases still being built, and the effect of the streets in some cities is much impoverished thereby.

While a great deal of attention has been paid to the massing and grouping of recent buildings, and some notable examples have been erected within the last few years, the same care has also in the best recent work been devoted to the detail, and much work has been done of a very interesting character, both of Gothic and Classic feeling, yet with a character of its own in each case.

It has been customary to call the Americans a *utilitarian* people, a nation too busy to think of art; the first they certainly are, the second they are not in any marked degree.

I may say at once that for architectural thoroughness in all departments the Americans seem decidedly our equals in most points, our inferiors in few, and in some our superiors.

The wave of what may be called "Art in the Home," for want of a better name,—that fondness for carrying art teachings in more or less perverted forms into our houses which has come upon us during recent years as a people, even more than on neighbouring nations, and of which the origin may be traced back through South Kensington teachings to the 1851 Exhibition,—has touched America very largely. It seems to be admitted also there that in matters of every-day life as well as in those with an artistic bearing the influence of French examples has now somewhat diminished, and that English inspirations and ideas are taking their place, or perhaps one ought rather to say are being grafted upon the old stock.

The result is a combination of many of the good qualities of the national characteristics of both in recent detail and in general design.

Utilitarian most undoubtedly the Americans are, but recently it is more often than not a union of the useful with the artistic. I presume, because their clients require a spur of no mean power.

As implied by the word "utilitarian," we chiefly find extreme examples of this quality in cases where interest, pecuniary or otherwise, prompts to a very careful attention to the fitness of a building for its purpose: this occurs mostly in towns where the pressure of business makes the smallest items of importance. In the country places a little more attention to artistic effect is allowed often to be accompanied by slight laxity in regard to utility.

The Americans are, perhaps, above all things looked upon by those whose knowledge of them has been gained by contact in that sphere, as a nation of prompt, keen, business-like men. What wonder, then, in the development of their country from a wilderness to one of the most complicated social systems in existence (a development accomplished, too, with unexampled rapidity), they should have grown careful and attentive to all the niceties of fitness for purpose in a building.

In the past,—that is, until their buildings began to improve in taste,—all this utility was accompanied by a vast amount of *gaucherie* in design and detail, but in most modern instances this has now given way to a keen artistic sense of the fitness of things; and while, on the one hand, the usefulness and fitness of their buildings has increased, at even a greater speed has their artistic expression increased, on the other hand.

Turning our glance to our own land, I doubt if we can say quite the same of ourselves. Granting that our artistic perception and expression have increased concurrently with theirs, can we say that our ability to meet given requirements is as great as theirs? In this comparison, as in others which I have drawn, or may draw, I refer rather to works a little superior to the average (by which, after all, a nation must be judged), than to the mediocre or to the most celebrated examples.

One or two examples of the attention paid to convenience may be worth noting. *Lifts* or *elevators* are very carefully considered in all the newer buildings in the chief cities; New York and Chicago are pre-eminent in this respect. All the large office buildings, apartment-houses (or houses in flats), and hotels are fitted with one, two, three, four, or even more elevators. In these buildings, particularly the office buildings, large numbers of people in continuous streams pass in and out to all floors the whole day long, and with a view to assist this traffic to upper floors, several elevators are required. Some run express to particular floors, others are on the principle of stopping trains, so that staircases are little used; but the top floors fetch rents as good as or better than the lower ones.

Systematic heating of the large buildings above mentioned is almost universal, and included in the tenant's rent, being worked from the central heating furnaces. Fittings generally are very carefully worked out, and anything found to cause the slightest trouble is revised and improved in the next building put up, and even if found to work well it is almost certain soon to be left behind by some new improvement.

The apartment houses, or houses in flats, most of which are of recent date, are designed upon principles which give the utmost economy of space and labour (the latter always a difficulty with houses in flats) and the greatest convenience, and much luxury is noticeable throughout the upper classes of the chief centres of population.

The building materials available in the United States are, of course, more diversified than those we have in England, owing to the vast network of railways which enables materials to run from one end of the Union to the other without transshipment.

Bricks, in great variety and of excellent quality, are obtainable. Stone of many kinds, suitable for delicate ornamental and carved work, or for coursed rubble, which latter has been used with good effect in many buildings near and far from Boston, as a centre, by Mr. H. H. Richardson; marble of good colour, tiles, slates, iron, and terra-cotta particularly, which has become, from small beginnings, quite an extensive industry in America, particularly in the construction of fireproof floors by hollow arch blocks on iron girders, and in other ways. Iron is also largely used in forms which frequently show questionable taste in detail, for the fronts of buildings,—in many cases for towers and mansard roofs, and frequently for internal door-linings and staircase-finishings, particularly in public buildings.

Painted tin, copper, brick, tar pavement, and other materials are used for roofs, both flat and of other shapes.

Many constructive subjects are, of necessity, omitted from this paper, and subjects such as plumbing, drainage, ventilation, warming, hospitals, more detailed notes of Government buildings, of houses in flats, and other particulars, of some of which drawings or diagrams are upon the screens. Any one anxious to get a clear insight into the views of Americans as to their own architectural history and present position cannot do better than read the articles whice have appeared from time to time in the *Century Magazine* during the past few years.

[The lecture was illustrated by drawings and lantern transparencies.]

THE CHURCHES OF WISBY IN GOTLAND.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The third ordinary meeting of the Institute for the present session was held on Monday evening last, Mr. Ewan Christian (President) in the chair.

The President announced that it was the intention of the Council on Monday, the 1st of February next, to nominate a gentleman to be recommended to the Queen as the Royal Gold Medallist for 1886. Any member desirous of making a suggestion thereon should do so on or before the last day of this month.

Mr. William White, F.S.A., then read a paper entitled "A Week at Wisby in Gotland." The visit, he said, had been a pleasant surprise to him, as he had no idea of finding in Gotland so good a field for the study of Gothic architecture, and so many interesting Mediæval remains. The island is eighty miles in length by twenty-five miles in breadth, and is studded with numerous villages, but in Wisby,—the capital of the island,—he found enough to interest him without stirring outside the town. The general appearance of Wisby is remarkably quaint and picturesque, rising on a steep slope from the sea, and being surrounded by a continuous stone wall, its line broken by bastions, gateways, and towers, at short intervals, except on the side towards the water. There was little about the construction or detail to denote the date of the walls, which were said to have been built at the end of the thirteenth century, on the site of still earlier walls, but there was evidence of their being thickened and raised subsequently to their first erection. The walls were in a good state of preservation, and, although they could not compete in magnitude or character with those of ancient Chester, yet the whole was remarkably complete. No passage-way was left on the top of the wall behind the parapet, but a wooden gallery was projected inside for defensive purposes. The towers were square in form and open on the side towards the town; several were saddle towers, being corbelled out on the wall equally on each side. Wisby, which now had a population of only 4,000, had probably as many as 20,000 inhabitants in the Middle Ages, and the churches were, doubtless, constructed by its wealthy merchants. There was now a singular sense of desertion and quiet in its irregular and roughly-paved streets, and the chief interest of the place centered in its churches, of which only ten remained, all of them being ruinous with the exception of St. Maria, which survived as the Cathedral Church. Mr. White exhibited some sketches and plans by Sir Henry Dryden and himself, and drew attention to the fact that these churches had been planned on a somewhat imposing scale. St. Gertrude, called the Church of the Netherland Merchants, was built about 1167; it appeared to have been a simple chapel, 61 ft. in length by 19 ft. in breadth, the side walls being nearly 4 ft. thick. Of the church of St. Oloff little more than a bit of the tower and

the base of a pillar remained. It had a fine western portal, and, as in the case of the other churches, staircases were carried up in the thickness of the walls in a direct line from doorways in the nave. The first bay of the nave was narrow, and the tower was vaulted with undressed stones. The Church of St. Clemens consisted of a nave of three bays with aisles, a chancel of two bays, a transeptal aisle on the south-west, and a western tower 26 ft. by 25 ft. inside, with walls 8 ft. 8 in. thick. The interior dimensions of the nave within the walls were 58 ft. by 54 ft.,—the proportions of a moderately-sized English parish church,—while its whole interior length was 145 ft. 9 in. The Church of the Helige-Ande, or Holy Ghost, was the Hospital Church. Its form was that of an octagon of 48 ft. by 45 ft. diameter, somewhat irregular in its setting out; the chancel being a little longer than square. This church had an upper and a lower nave, both commanding a view of the high altar. St. Nicholas's, the church of the Dominicans, was of considerable dimensions and vast proportions; the pillars rose to a height of upwards of 30 ft., and the central vaulting was lofty. This church was 64 ft. in breadth and 170 ft. in length, exclusive of 25 ft. or 30 ft. for the apsidal termination of the chancel; the walls being 4 ft. 11 in. thick. St. Katarina's, the church of the Franciscans or Grey Monks, was originally of the Romanesque period, remodelled into the Pointed, many indications of the earlier style still existing in blocked windows and fragments of detail. In the nave the lines of pillars were far from straight; the general width of the nave was about 23 ft., and that of the aisles from 12 ft. to 13 ft. The Dom Kircha, or Cathedral of St. Maria, was built by the Lubeck merchants. Its interior effect could hardly be considered interesting or attractive, a prevailing coat of whitewash covering it, and being fitted with cumbrous pews and doors with large locks. The pulpit was spacious, and had an elaborate staircase. There was also an hour-glass with silver settings, besides subsidiary glasses for the half-hours and quarters on the same frame, so as all to turn at once. The building consisted of a nave and continuous chancel each of three bays of 31 ft., of the same height and general treatment, and there was an additional narrow bay next the large central western tower. There was also a chapel of three bays against the three western bays of the south aisle; this was a good model of the Pointed style, and now served as a vestibule to the cathedral. Mr. White explained at some length the details of this building, stating that it was a great puzzle if compared with the Romanesque or Norman work of our own country. Its character was distinctly equivalent to that of our own work a century earlier. Fergusson spoke of its erection as dating about the year 1100, of its being burned down in 1175, and rebuilt in 1225, but in this case they should conclude not that the whole was rebuilt, but that it was only so far reconstructed as to change its appearance and character externally. The Church of St. Lawrence was said to date from 1046. It might be termed cruciform in plan, having a square nave, with small aisles at the four angles. Including the aisles the nave measured 50 ft. by 45 ft., while in the north-west wall was a singular recess or chamber, 12 ft. long by 3 ft. wide. The contiguous Church of St. Drotten formed nearly a square. The arches carrying the vaulting were Pointed; the apse was of a rude and early character about the windows and the corbel-table. The last church described was that of St. Hans, styled by Baedeker an insignificant ruin. It certainly was a ruin, but at the same time it was that of perhaps the most significant of these churches, and enough remained to tell of the grandeur of the first building and its re-construction. Was it insignificant to have the west wall of the nave 3 ft. 3 in. thick, with a window-jamb 23 ft. high? Was it nothing to have moulded corbels, admirably treated in proportion, with a projection of nearly 20 in. to carry ribs for a nave with a span of 43 ft.? The real insignificance must be in the eye which, in the absence of the complete building, was unable to grasp the indications of grandeur so clearly displayed by the fragments now remaining. According to our mode of computation, this work should date about 1100 or 1200, with an earlier church of the eleventh century. The remains were not many, but they were large and massive, and of an interesting character. Mr. White next quoted from Laing's "Tour in Sweden," published in 1839, in which Wisby was mentioned as "the Rome of modern architects who would deal in Gothic." The lecturer then summed up the characteristics of the buildings he had been describing. There was great thickness of wall, and numerous intramural staircases, with easy access to upper stories and roofs, and in several of the churches were dual staircases, apparently one for ascent and the other for descent. There were evidences of dignity, grandeur, and artistic finish. The walls were mostly rough, but with substantial stone quoins and dressings, and importance was given by a dignified and handsome entrance doorway. Great simplicity of treatment had generally been followed, though with carefully-considered detail in the more important parts. Then there was the peculiar double-splay in the windows, which had been handed down through the Romanesque and Pointed periods alike. The material generally was a hard limestone, or a coarse description of marble, varying in quality and irregular in appearance. Some of the stone consisted of a conglomerate of pebbles and broken pieces. In the work equivalent to our Norman, there was the same finely-dressed and squared masonry. Among the peculiarities of detail was the splay of the windows, outside as well as inside. In the middle of the wall, between the splays, was built up a slab of marble, forming the jamb to the tracery. The wonderful preservation of the ruins for so many centuries must be attributed to the fact that the churches were vaulted. Many of the vaults had fallen, but the substantial walls required in the first instance to carry them had resisted the storms and frosts of successive winters. No walls had been pushed out by rotting beams; on the other hand, some had suffered from the want of proper abutments to the arches. There was nothing to indicate the nature of the watershed, but it probably consisted of shingles. Mr. White concluded by saying that he could not remember a week spent with more interest in art research except in Rome and Florence, and he might endorse the quotation he had already given that Wisby was the Rome of the modern architect who would deal in Gothic.

The President, in inviting discussion, thought Mr. White had shown conclusively how to enjoy a holiday to the best advantage. A communication had been sent in by Mr. Carpenter on the same subject, but time did not permit of its being read that evening. He would call upon Mr. Haig, a well-known authority on Swedish antiquities, for a few remarks.

Mr. A. H. Haig expressed his admiration at the amount of work which had been got through by Mr. White in so short a time. The architecture of Wisby was certainly very rude, but it was extremely instructive, and therefore well worth studying. There were four towers on the city wall towards the sea; one was a semicircular tower of strong construction standing at the north-western corner of the wall towards the shore, while there was another about 150 yards from it, called the Maiden Tower, which was very interesting. The walls were constructed in two periods. The first part was built about 1280 by peasants employed by the citizens, but was found to be too low, and another portion was built inside. There were four gates to the town walls, which were about 80 ft. high, and, in some parts, 8 ft. thick. It was necessary to be cautious in accepting the dates given by the chroniclers. For instance, when it appeared from these that a church now existing was built in 1050, it might be set down as being a century later in date, because it was known that Christianity was only introduced into Gotland in 1028, by Olaf the Saint. As the first churches were no doubt of wood, and lasted probably about 100 years, the stone churches could not have been known before the beginning of the twelfth century. Many conjectures have been made as to the reason for making Heilig-Ands a double church, but the most probable solution was that this particular part of the town was much crowded before 1450, and it was therefore necessary to build the church in two stories. St. Maria, now used as the parish church, was a building of many dates, commencing with 1225, the chapel being an interesting work of Late Pointed character. There were some ninety churches altogether in the island, all of which were more or less interesting. They were generally small, some being divided into a nave and two aisles, while others were divided into two aisles with a row of columns down the middle. These churches were mostly square in plan, the walls being pierced on the south side, as the north side was usually the coldest, and was utilised for decoration. Indeed, in many of these old churches a great deal of wall-painting remained under the whitewash. The towers were, as a rule, too high in proportion to the churches; they were used for defence, and only in later periods were they of a different character. Towards the end of the fourteenth century it was found that many of the churches were too small, and then the old chancel was pulled down and a large one commenced. The means, however, did not readily come in, and they were obliged to stop at the chancel. The churches, therefore, presented the curious appearance of having naves greatly lower than the new chancels. The architecture, as a rule, was made, and it would be wrong to say that it had gone before the architecture of similar styles in other countries. It must have been carried there from other lands, and was of later date than buildings of corresponding style found elsewhere.

Mr. Alexander Payne drew attention to what he regarded as the very remarkable plan of the Church of St. Lawrence, which was very similar to that of a Greek cross. In Athens and Byzantium dozens of churches of a similar plan were to be met with. Could there have been any connexion between Gotland and Greece?

Mr. Aston Webb proposed a vote of thanks to Mr. White. He had noticed that, in many of the plans exhibited on the screen, the chancel was wider than the nave, while the priests' door in the chancel seemed to be rather far west.

Mr. Charles Fowler, in seconding the vote of thanks, observed that there was a church of St. Nicholas in almost every town of Northern Europe. Along the Rhine were to be found a number of picturesque churches which might be termed Romanesque, and which might at a first glance be put down as of the same date; but they were really of the same date as our Early Pointed churches. This might easily be the case in a place so far north as Gotland, and would doubtless partly explain the style; its being started later, and its continuing longer.

The vote of thanks was then put, and was cordially received.

Mr. White replied, adding that he hoped some day to visit the country churches of Gotland. In reply to Mr. Payne's question, he said he had been told that there was some likeness in the design of the Greek and the ancient Swedish ships. The Phœnicians had spread over the whole of the old world, and as the Greeks were also a maritime power, they might possibly have taken their ideas along with them. The cruciform plan referred to was apparently Byzantine in its origin, but as the two larger pillars at one side partly carried the tower, there would not be room for a cupola to come over the centre of the church, in the same way as if the western portion were lower. He had purposely refrained from going into the question of bisected naves, but examples of these were to be found in England. A small village church in Hampshire, for example, had a bisected nave, but he believed it was a mere matter of construction,—opening the chancel more fully to the whole body of the worshippers, than if the pillars were on the two sides.

Before the meeting closed, the President submitted a communication from Mr. Wyatt Papworth, asking whether the Institute intended to consider the subject of the rebuilding of the premises at the east end of St. Paul's Churchyard, which to his mind was more important than the opening up of Whitehall and the Mall. Mr. Papworth drew attention to a letter from Mr. Penrose which had appeared in the *Times*, and he enclosed a block plan of the locality. The whole block he considered should be taken down, not only for facilitating the traffic, but for insuring the safety of the cathedral. The President, in submitting this communication, invited the opinion of the members present upon the subject. It would be a great advantage if the whole block could be removed, thus opening up the eastern end of St. Paul's, but it was very doubtful whether the Institute could do anything in the matter. Mr. Penrose alluded specially to the danger to the cathedral from the erection of a lofty building at its eastern end.

Mr. Edward Woodthorpe thought that if they could not get the whole building thrown back,

they might at least move for a limitation of the height of the buildings and the depth of basement. As to getting the ground, he believed that was impossible; as the Government had done nothing in public improvements, it was perfectly useless to apply to the City Companies. While foreign Governments moved in these matters, ours would do nothing, and it was the duty of this Institute to show how incapable the Government was in regard to improving the public taste.

Professor Kerr considered that the Institute was bound in duty to take up this subject in some shape or other. When the Institute's Departmental Committees were established, it would be the function of one of those committees to deal with such matters. In the meantime, however, the Council, in conjunction with a few gentlemen acquainted with the subject, might draw up a report, which should be made public. If it had no practical effect, it would at least open the eyes of the public to the views of the profession.

Mr. I'Anson agreed with Professor Kerr that the matter should be left to the Council, who would certainly do their best to call public attention to it.

It was unanimously agreed in the end to leave the matter in the hands of the Council.

The meeting was then adjourned to the 18th of January, when a business meeting will be held.

SHERBORNE ABBEY CHURCH.

THE restoration of the tower, now completed, brings to a close a work which was commenced thirty-five years ago, when, under the late Mr. R. C. Carpenter, the nave and aisles, with the transepts, were restored at a large cost. The late Earl Digby was a large contributor. After Earl Digby's death, his successor, Mr. G. D. Wingfield Digby, took in hand, at his own cost, the restoration of the magnificent choir, under the late Mr. W. Slater. It involved the re-construction of the fan groining, and included reredos, stalls, and stained glass in all the great windows. The Norman piers of Bishop Rogers's date were built in the "sham" way in which those of Peterborough and Chichester were found to have been built, and were in such a state that Mr. R. C. Carpenter, in 1853, after erecting a great timber centre and supports, took out, piece by piece, the whole of the earlier piers, replacing the shell and rubbish with hard Ham stone masonry. He also repaired the western piers. When, therefore, in 1883, it was determined to restore the upper part of the tower, the architects, Mr. R. Herbert Carpenter and Mr. B. Ingelow, found that they had good solid legs on which to work; the western and eastern arches had, however, sunk very much, causing great fissures, and the walls of the belfry-stage inclined to the east, under the pressure of the great "Wolsey" bell. Prof. Wilkins, in 1828, had reported on the tower, and afterwards his suggestions, in principle, were carried out by introducing great timber supports under the bell-beams, to throw their weight on the northern and southern walls.

In 1883 a scaffolding was erected, and Mr. Carpenter marked each stone of the tower which was to be renewed or repaired. It was found necessary to construct a strong brick arch, resting on the solid piers and tied by iron, to carry the east wall, which was taken down and rebuilt,—the Norman work being replaced. A somewhat similar treatment was necessary to the west wall. The parapet is new, and the pinnacles, long lost, have been reproduced on their old bases.

All new masonry is in the hardest bed of Ham Hill stone, the decay of the tower being due to some extent to the use of inferior local stone. The builder is Mr. Betton, of Sherborne; and the clerk of works is Mr. Smith. The tower and its pinnacles are now protected by a system of lightning conductors by Messrs. Sanderson & Co.

The bells have been re-hung in a new oak frame by Messrs. Warner & Sons, using Goslin's patent, and the Wolsey tenor bell can now be rung by one man instead of requiring three men as before. A few days ago, for the first time in their history, a "grandsire triple" was rung by the "College Youths," and the bells were "fired," so as to test in every way the stability of the new work.

The church itself is now completed, but it is possible that ere long the beautiful Early English Lady-chapel may be rebuilt. One of its bays is still preserved entire in a house, with its old painting, carving, and gilding, and also the chantry chapels added as aisles in the fifteenth century. Further works are in contemplation for the King's Schools, including a restoration of part of the great Gate-house of the Abbey, formerly a three-storied building in the type of the "Ely Porta" of the Ely Monastery, and also the repair of the original schoolroom of Edward VI., now the dining-hall of the "school-house."

AWARD OF MEDALS AND PRIZES AT THE ROYAL ACADEMY.

THE following awards for Painting and Sculpture were made on Thursday evening, the 10th inst.:—Historical painting, subject "A Scene from Hamlet," Gold Medal and Travelling Studentship, H. B. Fisher (the grave scene); Turner Gold Medal and Scholarship, subject "The Mountain of Clouds," from the "Arabian Nights," C. A. Wilkinson; Creswick Prize, subject "A Stagnant Pool," Miss M. Tayler; Armitage Prize, subject "Joseph discovering Himself to his Brethren," Bronze Medal and 30*l.*, W. H. Margetson; 10*l.* premium, S. Paget.* Painting of a figure from the life, First, Silver Medal, W. Dickson; Second, Silver Medal, P. F. Bell. Painting of a head from the life, First, Silver Medal, A. J. Foster; Second, Silver Medal, A. T. Nowell. Copy of an oil painting, subject "Portrait of the Painter, by Sir Joshua Reynolds," First, Silver Medal, S. G. Enderby; Second, Silver Medal, not awarded. Design for decoration, subject "Peace and Plenty," R. A. Bell. Drawing of a head from the life, First, Silver Medal, Miss A. Sherriff; Second, Silver Medal, Miss B. M. Latham. Set of three drawings from the life, First, Silver Medal, Miss B. M. Latham. Set of three drawings from the life, First prize, G. Hutchinson; Second, H. Copping; Third, C. W. Bartlett; Fourth, G. S. Knowles. Drawing of a statue or group, Miss H. Coombe. Perspective drawing, Silver Medal, E. A. T. Scott. Cartoon of a draped figure, subject "Grief," Silver Medal and Prize, Miss M. A. H. Simpson. Prize for a line engraving, no competition. Gold Medal and Travelling Studentship in Sculpture, subject "Cain the Outcast," F. W. Pomeroy. Set of two models of a figure from the life, First prize, A. G. Walker; Second, W. G. John. Model of a design in the round, subject "Mercy pleading for the Vanquished," First prize, W. E. R. Stephens; Second, A. G. Walker. Model of a statue or group, subject "Charity"; on the reverse, "Clothing the Naked," John Rhind. Design for a medal, Silver Medal, not awarded.

The Awards for Architecture were given in our last, p. 846.

* Disqualified on account of having received the same reward previously.

WEST LONDON SCHOOL OF ART.

THE annual presentation of prizes to the students of this Institution took place on Wednesday evening last at the Steinway Hall, Lower Seymour-street, when, as on former occasions, a number of the best productions of the students were exhibited.

Mr. George A. Thrupp, who presided, expressed gratification with the past year's work, the good attendance of the pupils, and the great benefit they had derived under the able instruction of their new head-master, Mr. George G. Simpson, whom he called upon to read his report, which stated that during the past year 427 students attended the school, showing a slight increase on the number attending during the previous year. The fees amounted to 951*l.* 1s. 9d., being 67*l.* 8s. 5d. in excess of the amount received during the preceding twelve months. The claim of the school upon the Government for the grant on results was 457*l.* 7s. 3d., being slightly less than in 1884. The Travelling Studentship of the value of 50*l.*, offered to the West London School by Mr. List, through the Painters' Company, was this year awarded to Edward Ingram Taylor. The trustees of a fund provided by the Owen Jones Memorial Committee, for the encouragement of decorative art, offer six prizes annually for the six best designs in furniture, decoration, &c. Each prize consists of a bound copy of Owen Jones' "Principles of Design," and the Bronze Medal of the Society of Arts. Two prizes out of the six were awarded to students of this school.

Sir Philip Cunliffe Owen, in addressing the company, expressed the gratification it afforded him to be able to say that now the West London School, which had always striven to maintain its efficiency, stood very nearly foremost amongst kindred institutions in the metropolis. It was of the utmost importance that England should not only maintain, but should strenuously endeavour to increase and strengthen, her hold upon the commerce of the world, and this would best be accomplished through her schools of art. It used to be the common expresion, "They do things better in France"; perhaps that was true many years since, but he had visited that country on various occasions in recent years, and thought that we in England did things just as well,—even somewhat better in the present day than our Continental friends. The idea had long prevailed that if we wanted really good artistic designs, we must go abroad for them. It was not so in the present day, and if only our young people would be sufficiently patriotic to attend schools of art we need not fear foreign competition. We should never have obtained the leading position we now occupy but for the enthusiasm which the flower of the nation had evinced, and we could not maintain our present eminence either in arts or manufactures unless these institutions were adequately attended by young men and women who took a lively interest in their studies. He would like to see guilds established like those in France, where masters, foremen, and workmen met together for the purpose of deciding how they could best promote and further the interests of their respective trades. Since the Exhibition of 1878 these Parisian guilds had been duly recognised by the Government; there had been juries appointed, who examined the various classes of manufactures, but only one report, he regretted, had hitherto been published, and that was unanimously in favour of an English firm. South Kensington had a precious collection, valued at two millions sterling, which adequately contributed to twenty-five or thirty exhibitions annually throughout the country, and he hoped that ere many years had passed every municipality throughout the kingdom, through the encouragement thus afforded it, would foster the arts and manufactures by having an institution of its own.

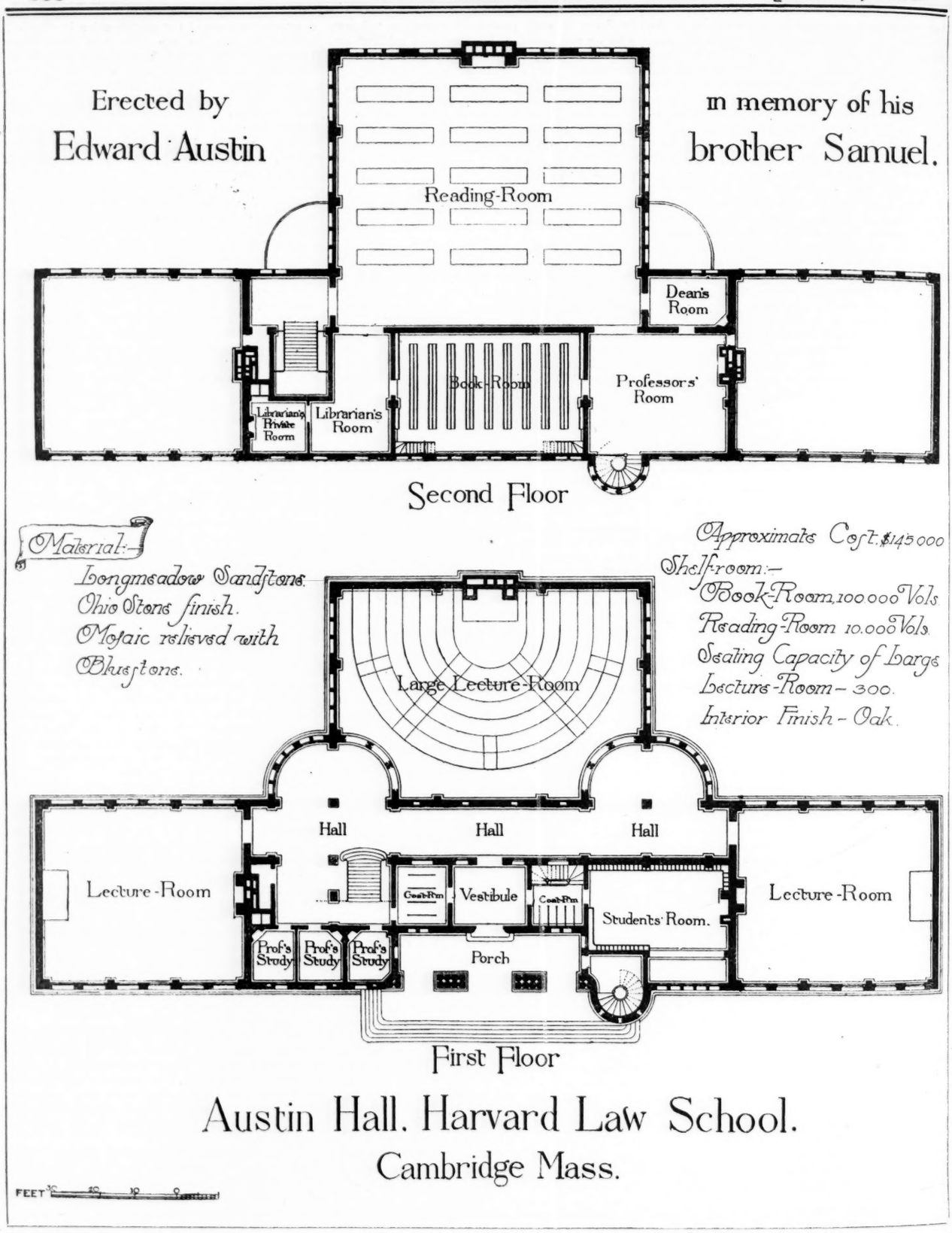
Sir Philip then distributed the prizes, the most successful students being warmly applauded. Among the prize-winners we may name Edward Ingram Taylor, who took the Gold Medal for his design for the interior decoration of a building; Edgar H. Turner, who took a Silver Medal for his design for the decoration of a frieze; Agnes W. Guest, to whom was awarded a Bronze Medal for designs for wall-tiles; Herbert C. Cane, who took a Queen's Prize for a design for a wrought-iron lamp and bracket; Florence E. Hannam, two Queen's Prizes, for designs for tiles and a design for a plate; and Janet Hayley, Queen's Prize, for design for interior decoration. The winners of the Owen Jones Prizes, referred to in the Master's report, were Maud Johnson and Edgar H. Turner.

Mr. J. H. Donaldson, in moving a vote of thanks to the head master and his assistants, remarked that as a large manufacturer he considered it a matter of inexpressible importance to England,—to manufacturers and artisans alike,—that we should make determined progress, since much yet remained to be done in that direction.

Mr. L. Aumonier (of the firm of Messrs. Woollams & Co.), in seconding the vote, remarked that twenty-five years ago the greater number of the designs for wall-papers were purchased from foreigners,—principally from Frenchmen,—but now foreign designs did not amount to one per cent., and he had not purchased a foreign design for seven years, the whole of his having been obtained from past or present pupils of that school. Seeing some of these on view, he explained their merits, and stated that it was his intention to give two guineas per annum for five years to the student who produced the best design for paperhangings of artistic merit.

A vote of thanks to the Chairman concluded the proceedings.

Artists' Volunteer Corps. — The annual dinner of C Company of the Artists' Volunteer Corps (Capt. W. Spiers) took place at the Holborn Restaurant on Tuesday evening. The company is composed almost exclusively of members of the architectural profession.



Illustrations.

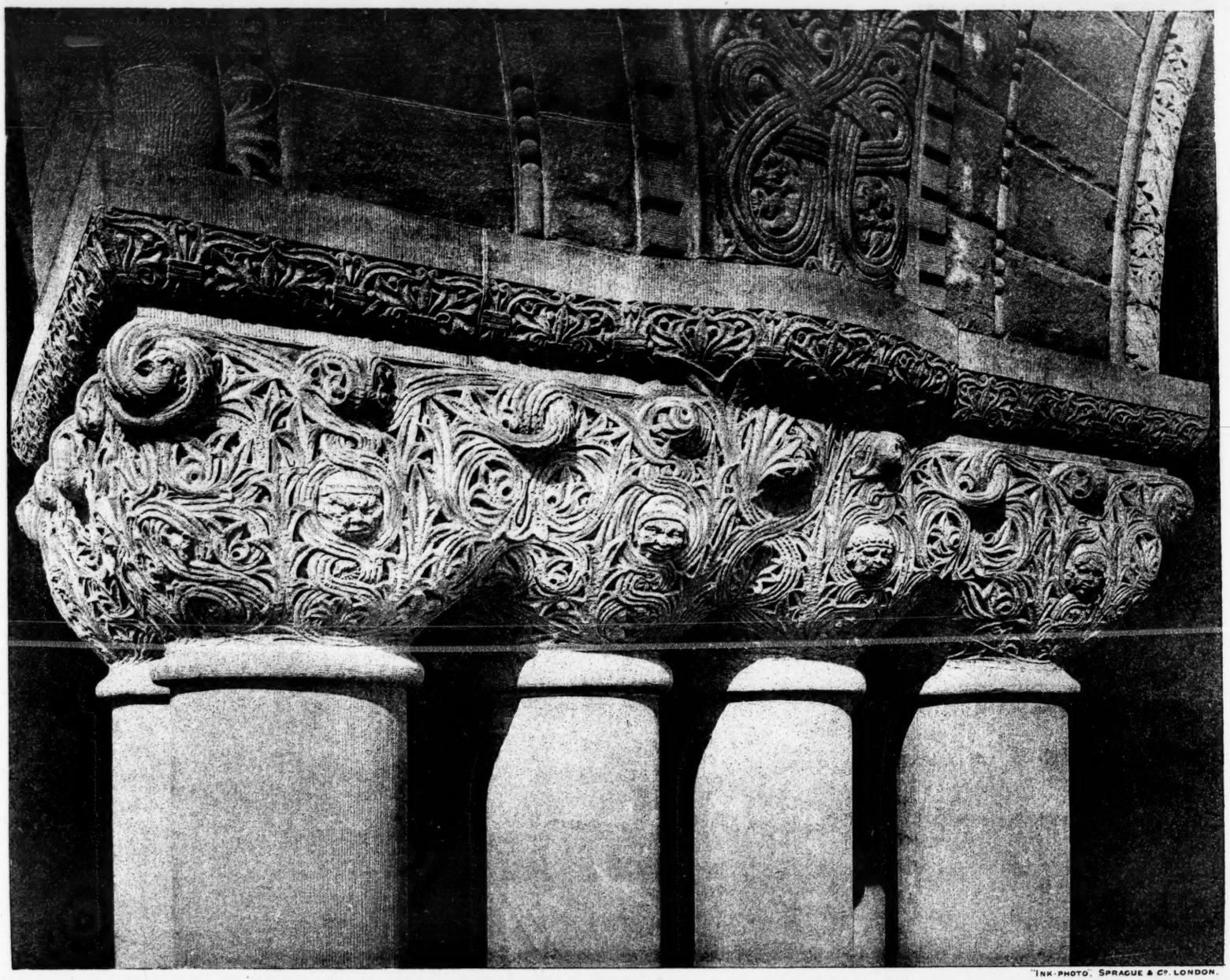
AUSTIN HALL, HARVARD LAW SCHOOLS, CAMBRIDGE, MASS.

OUR columns this week contain an interesting paper by an English architect on the artistic qualities of American architecture, in the course of which it is argued that architecture in America is at this moment far more advanced in the path of picturesqueness and originality than critics of a few years back held that it ever would or could advance. There could hardly be a more pointed comment on this opinion than is furnished by the illustration we give of the Austin Hall at Cambridge, U.S., built from the designs of Mr. H. H. Richardson.

If it were true a quarter of a century ago that American architects took no thought for design save to invest their buildings in a more or less orthodox clothing of Classic columns or Gothic buttresses, this criticism has to be revised now. There may be differences of opinion as to the beauty of Mr. Richardson's design; there can be none in regard to its force, vigour, and originality. Of course, in regard to the latter point, the decorative treatment is based on Byzantine and Romanesque types, but there is hardly anything of mere imitation in it.

The rough finish of certain portions of the masonry, especially noticeable in what must be called "the frieze," when we should rather expect a finished surface, is one of the means of gaining force and variety of expression which appears to be a good deal adopted by some American architects now: as applied in the frieze here it appears to us an eyesore, and gives the impression of the stone having decayed; it appears, in fact, rather like a caprice. The plan of the building, accompanied by some brief particulars, is subjoined.

The illustratioms are reproduced (by permission) from a fine portfolio of photographs of the building, forwarded to us under the title "Monographs of American Architecture." We shall be very glad to see more such monographs.



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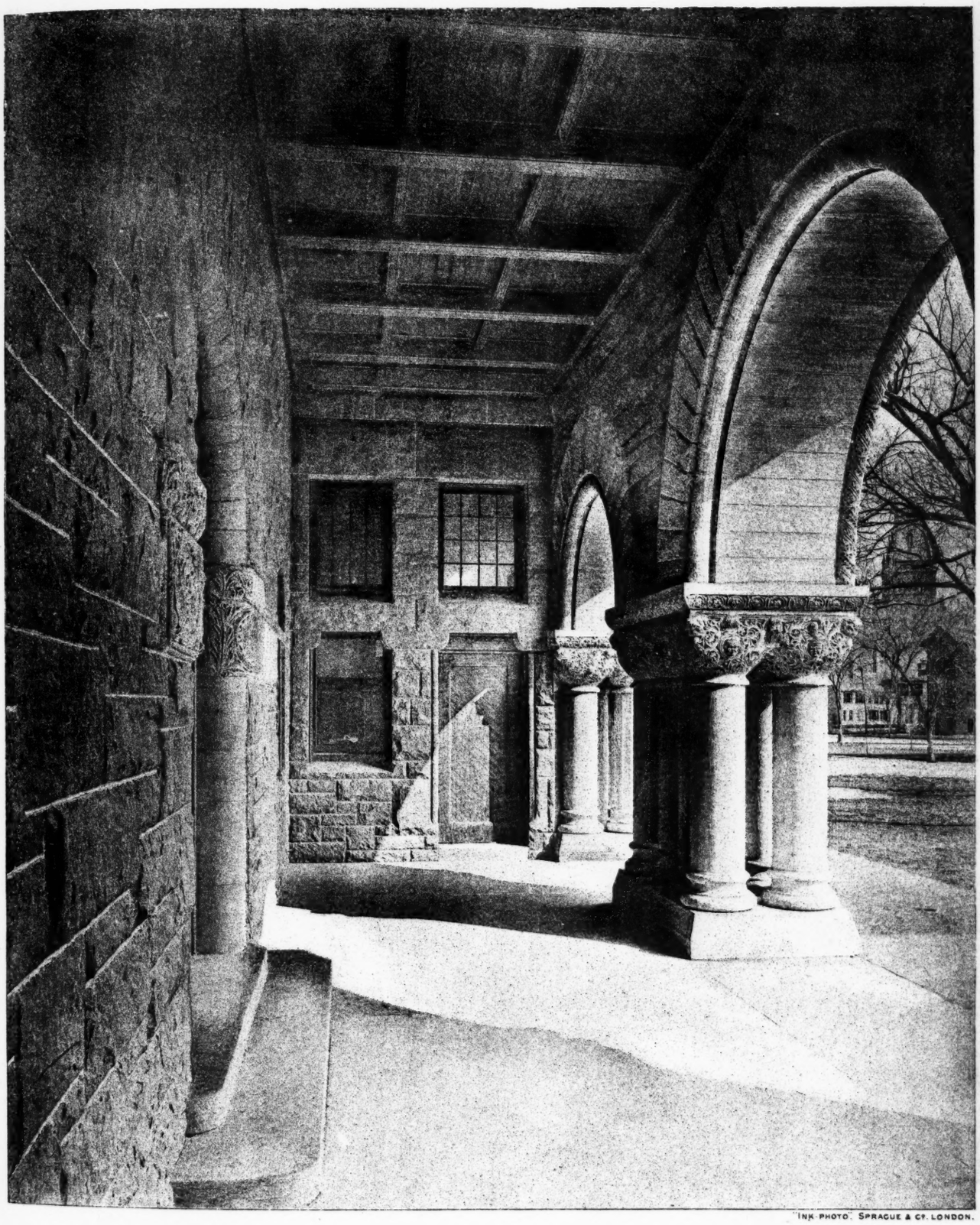
AUSTIN HALL, HARVARD LAW SCHOOL, CAMBRIDGE, MASS.—MR. H. H. RICHARDSON, ARCHITECT.

(CAPITALS, ENTRANCE PORCH.)



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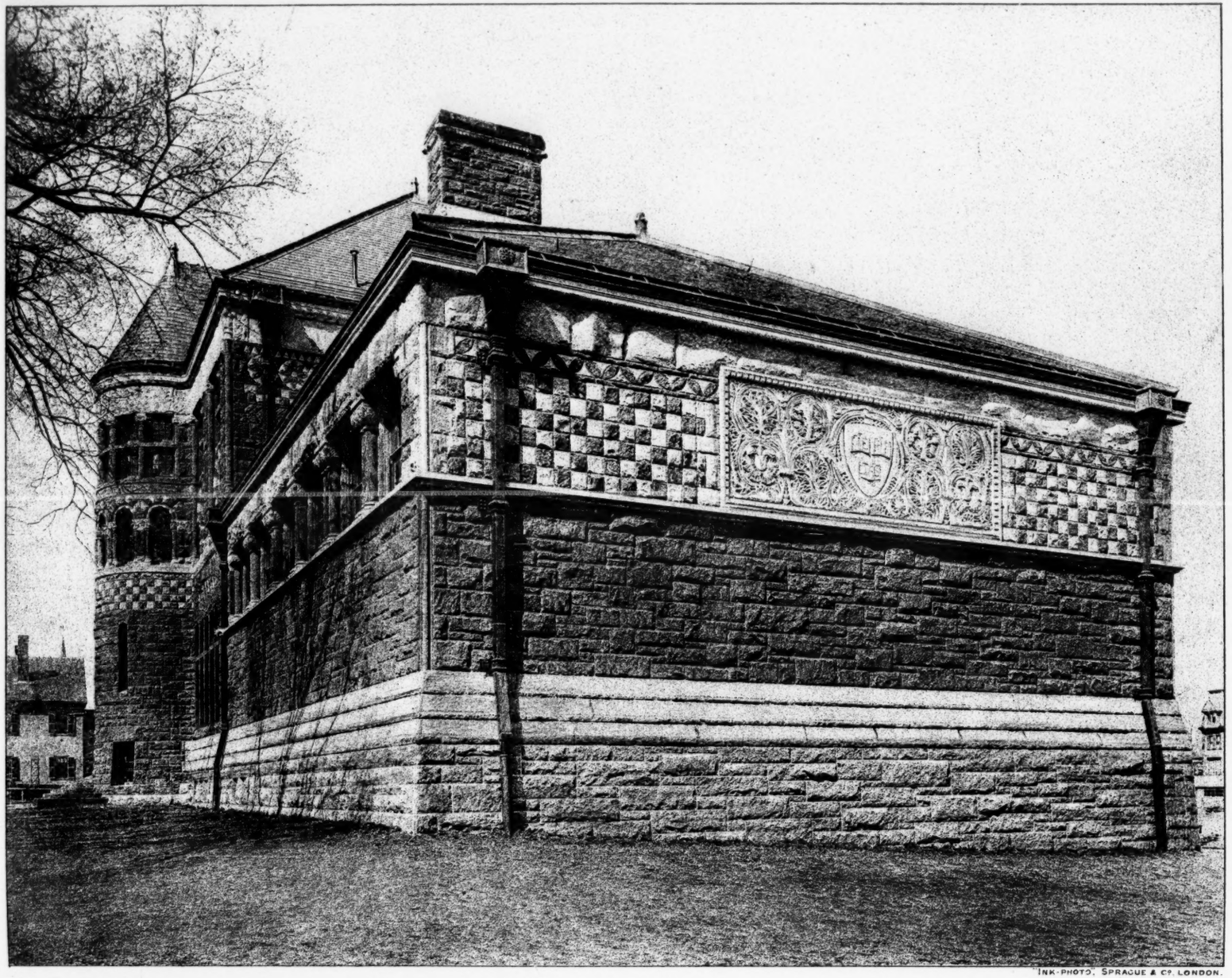
AUSTIN HALL, HARVARD LAW SCHOOL, CAMBRIDGE, MASS.—Mr. H. H. Richardson, Architect.

(ENTRANCE PORCH.)



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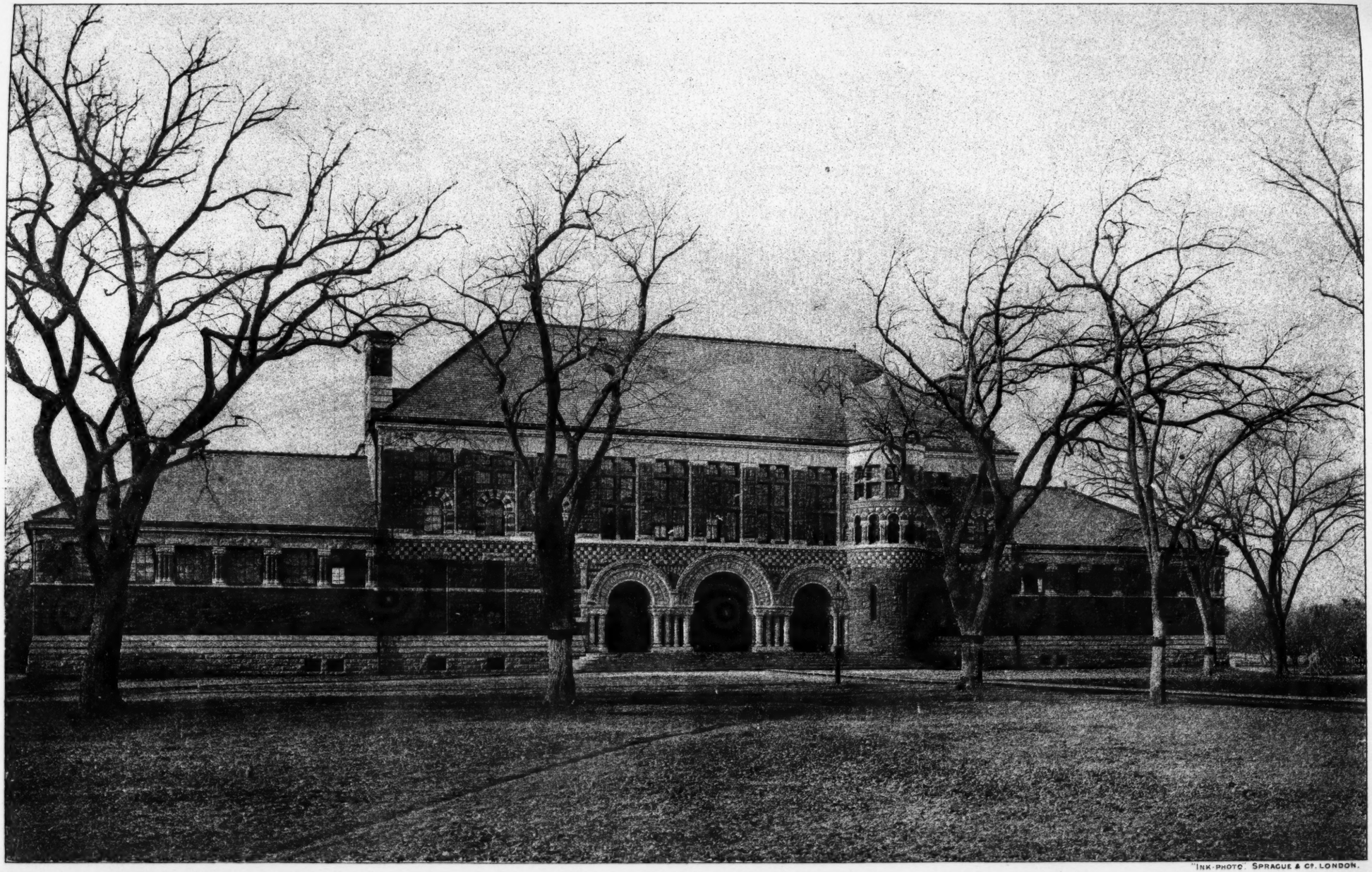
AUSTIN HALL, HARVARD LAW SCHOOL, CAMBRIDGE, MASS.—Mr. H. H. Richardson, Architect.

(END VIEW.)



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AUSTIN HALL, HARVARD LAW SCHOOL, CAMBRIDGE, MASS.—MR. H. H. RICHARDSON, ARCHITECT.

(FRONT VIEW.)

Surrey Gardens
Mission Hall
Walworth

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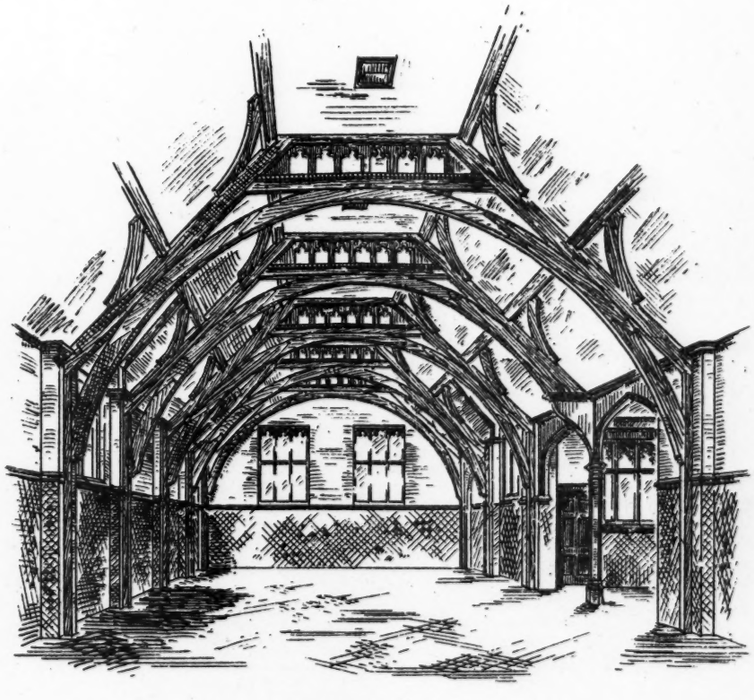
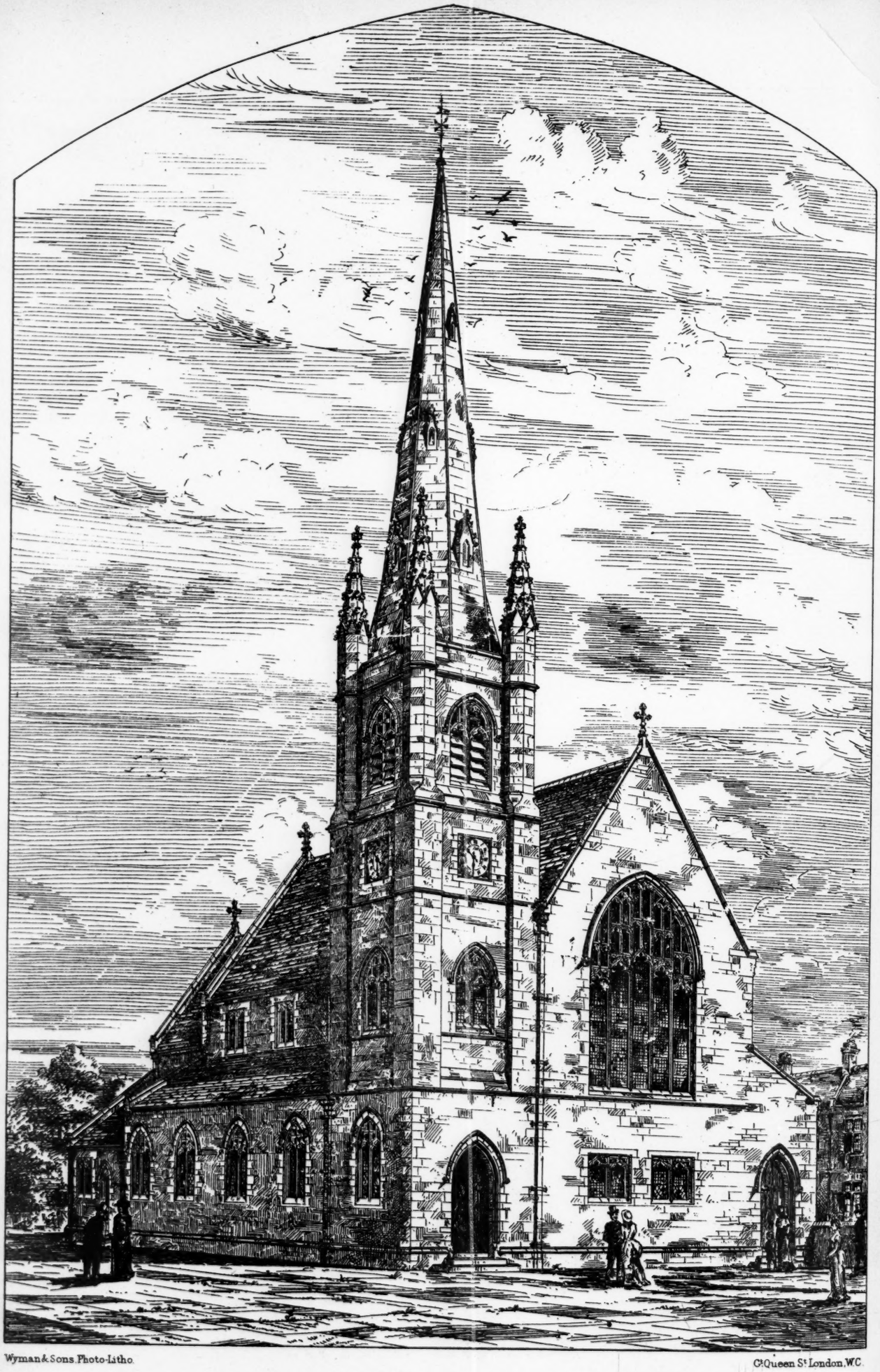
MISSION HALLS.—Messrs. Romaine Walk

S. Anne's Mission Hall
Bermondsey.



Interior.

Westcombe Park
Mission Room.



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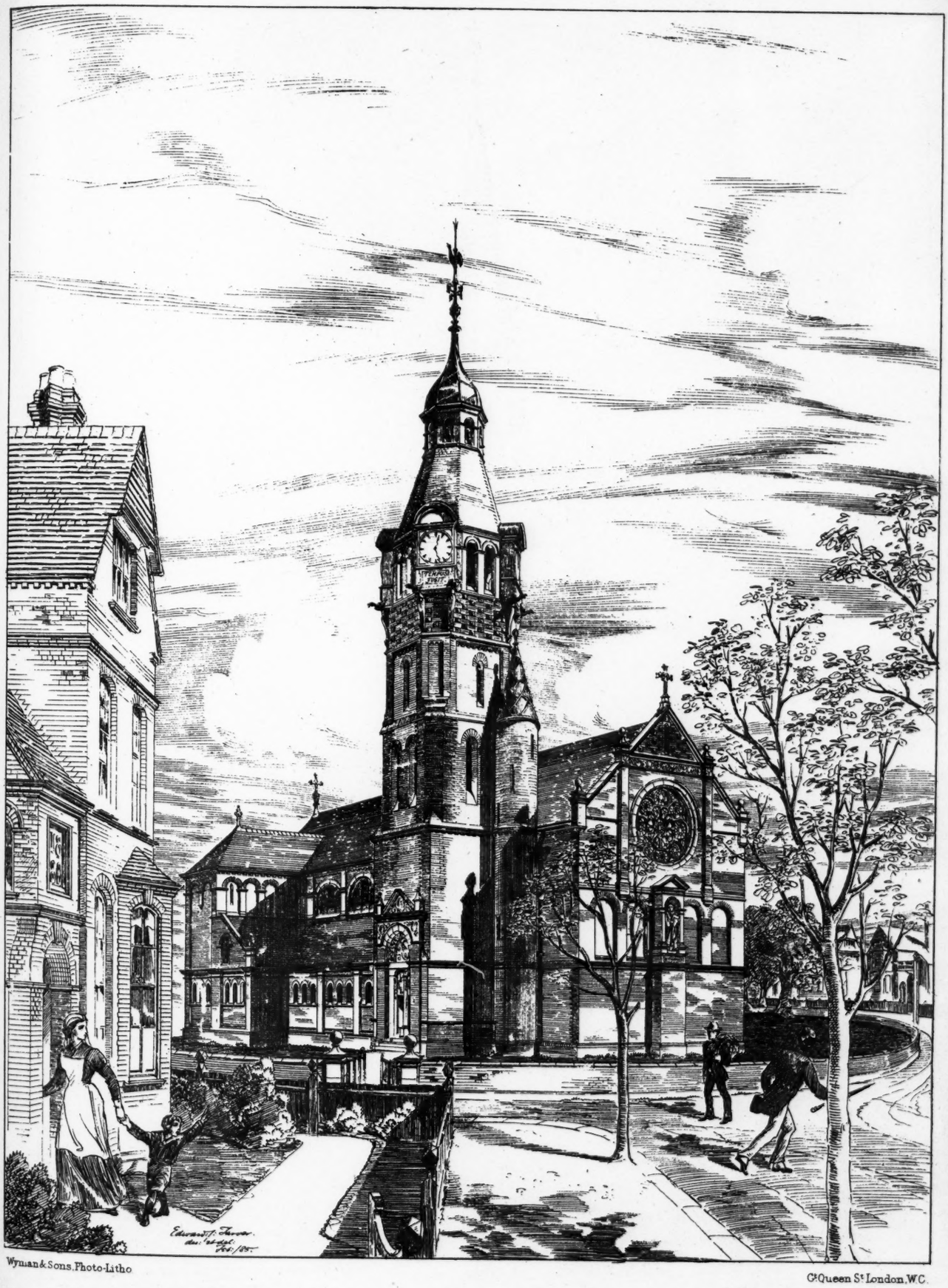
INDEPENDENT CHURCH, STAND, NEAR MANCHESTER.—Mr. J. P. Pritchett, Architect.



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DESIGN FOR A SUBURBAN CHURCH.—By Mr. E. J. Tarver, Architect.

MISSION HALLS.

THIS sheet of Rochester Diocesan Mission Halls shows a few of those recently designed by Messrs. Romaine-Walker & Tanner, architects.

The Surrey Gardens Mission Hall is attached to St. Paul's, Lorrimore-square, and presents somewhat novel features in construction. The building committee desired an edifice partaking of a secular as well as an ecclesiastical character, in order to gain the attendance of those classes at the services in the hall who would not readily enter a church. The architects were also informed that there was a possibility in the future of the building being extended in length and converted into purely ecclesiastical uses. The internal dimensions are 70 ft. by 55 ft., and the varied requirements were met by the use of iron. Four iron stanchions are placed in the angles of a square about 24 ft. each way, dividing the hall into three bays, each about 24 ft. These stanchions support longitudinally bressummer girders, carrying the dwarf upper walls and gabled windows. To the heads of the stanchions above the girders are secured wrought-iron principals or trusses formed to the slopes of the roof, and constructed to prevent any outward thrust. The ridge is iron, and the purlins are iron. The principals of the lower roofs are also iron, and bolted to the stanchions and bressummers. This construction rendered all outside buttresses unnecessary, and every inch of area was available for the floor-space of the hall. The ironwork was so designed as to give the effect, when cased in wood, of curved principals supported by wooden piers with carved caps; and longitudinally there are segmental arches to every bay, forming an arcade, and the whole interior presents a novel and striking effect. The building has excellent acoustic properties.

The exterior is of red brick and Box ground Bath stone, and is roofed with tiles. A small vestry is adjacent to the platform end, with lavatories and heating-chamber below. The building is warmed with large-bore pipes, carried out by Messrs. Richardson & Slade. There is also a special system of ventilation. The constructive ironwork was carried out by Messrs. Dennett & Ingle. The floor is wood block paving. The general contractors were Messrs. H. Burman & Son, who also prepared the seating, which is reversible, and will accommodate 800 persons.

Westcombe Park Mission Hall is attached to Christ Church, East Greenwich, and is a building, 60 ft. by 30 ft., with a class-room, 19 ft. by 18 ft.; there is also a vestry, a range and boiler, and all necessary offices. The exterior is faced with stock bricks and hung tiles. The roofs are tiled. The interior is spanned by four trusses, and to avoid cross-ties the wall-pieces are taken down to the ground. An Ulverston coil-shutter divides the class-room and hall. The floor is paved with wood blocks on concrete. The seating was made by Messrs. H. Burman & Son, and the hall holds 450 persons. The heating-apparatus was put in by Messrs. R. Renton Gibbs & Son, on their small-bore pipe system. The general contractor was Mr. R. Lewis Wood, and the clerk of works Mr. V. Hibbins.

St. Anne's Mission Hall, Bermondsey, is to be started early in the new year.

A Mission Hall connected with the Church of the Ascension, Lavender-hill, is in progress, and when complete will accommodate 1,000 adults. The first block, seating 500, will be opened at Christmas. In connexion with the Wilberforce Mission House, at Newington-butts, which was opened last year, the new Memorial Hall has been completed this autumn. These two buildings, as well as those illustrated, are by the same architects.

STAND INDEPENDENT CHURCH, NEAR MANCHESTER.

THE design which we illustrate was selected in a competition limited to four firms of experience in Nonconformist Church building. The chief difficulty the designers had to contend with was the limited area of the site, which is in a graveyard that has been in use for 200 years, and is still used,—hence the total absence of buttresses.

A crypt extends under the whole area, the roof forming the floor of the church, being of cement concrete and iron joists, covered on the top with wood block paving for the seats, and mosaic tiles for the gangways. The building is faced with parpoints from Brighouse, and the dressings are of best white stone, from Hollington.

Internally, the nave is divided from the aisles by an arcade having pillars of polished red Peterhead granite, with carved caps, and moulded arches of stone. The chancel arch is similarly treated, and the organ-chamber has also arches opening into the nave and chancel.

The roofs are hammer-beam and wagon-headed, groined in the lower part between the clearstory windows. The pulpit, prayer-desk, and choir-stalls are to be of oak, the rest of the woodwork of pitch pine. The reredos will be enriched by terra-cotta basreliefs of the "Last Supper," "Christ Healing the Blind," and "Christ Healing the Deaf," modelled by Morris. The windows are to be all of muffled glass, slightly tinted, with boders and divisions of rich colours and roundels, and simple devices in the tracery.

The architect is Mr. J. P. Pritchett, of Darlington.

The memorial stone was laid on Saturday, July 25th, with the usual ceremonies.

DESIGN FOR A SUBURBAN CHURCH.

THIS is a design for a church for a site on the Telford Park Estate, where there at present exists a temporary church, the full attendance at which encourages the hope that the permanent church may soon take its place.

The site adjoins cross roads, and will be passed, not only by residents on the estate, but by many others living in Clapham Park, on their way to Streatham Hill Station.

A clock, therefore, which may be seen from several directions to give the correct time to the neighbourhood, is the main feature of the tower. The tower is enlarged at the stage where this important use is fulfilled, and space is thus provided for bells as well; an upper belfry being available for a carillon to be worked by the clock.

As regards the body of the church, an arrangement is adopted which,—as proved by the estimates,—reduces the cost far below that involved by the usual constructive features.

The style of the building is that of the surrounding houses, for the use of whose inhabitants the church is required.

EDWARD J. TARVER.

TUNBRIDGE WELLS WATER SUPPLY.

TUNBRIDGE WELLS, on December 10th, was *en fête* to signalise the completion of an important increase to its water supply by the open- of a new reservoir at Pembury, which, with a top area of seven acres, is capable of holding 45,000,000 gallons. The scheme, which has cost 33,000*l.* to carry out, was first mooted in 1875, but active constructional operations were not commenced until the end of 1881. After delays of various kinds, the opening ceremony was last week performed by the wife of the Chairman of the Local Board.

The work, which embodies some points of special interest, necessitated the excavation of 120,000 yards of earth, which has been utilised in the construction of two artificial embankments, each having a base thickness of 156 ft. The reservoir, which is 27 ft. deep, has 21,418 square yards of bottom surface, which was concreted to a depth of 12 in., while the slopes measure 13,222 square yards, also concreted with an average thickness of 9 in. The whole of this 34,640 square yards of concrete was afterwards covered with Bradshaw's Limmer Asphalte of a thickness of ½ in. to ¾ in.

The engineer, Mr. W. Brentnall, M.I.C.E., at the dinner following the opening ceremony, gave a detailed account of the work, and emphasised the importance of two interesting points of departure taken by him from the methods usually employed in such undertakings. He said:—There are some features of engineering interest in connexion with these works. I will mention two only, which will perhaps allay the fears some may have as to the stability of the embankments. Storage reservoirs are usually so constructed that only one artificially-made embankment is required, which is built up in thick layers of earth, of 11 in. to 2 ft. in thickness, tipped loosely from barrows or wagons, and consolidated by its own weight (a very uneven and imperfect consolidation, taking an indefinite length of time); a clay-puddle wall in the centre of the embankment being relied on for water-tightness. This sometimes fails with most calamitous results. In the present case the site of the reservoir was arbitrarily fixed by the relative positions of the engine-house and tunnel of the old works; and two artificial embankments were imperatively necessary. I made a wide departure from the ordinary method of construction, just explained, in constructing the embankments in layers of earth fresh from the excavation, laid only 6 in. thick, with a little water added, and then rolled and cross-rolled with a steam roller, until each layer was reduced to about 3½ in. thick. By this method the embankments were at once consolidated equal to the original earth; no subsidence whatever taking place, as is proved by the brickwork erected upon it remaining perfectly sound; indeed, so perfect was the consolidation that when the men were required to move some of it, it was like a piece of rock, and had to be picked out. The reservoir is, in fact, unique in this respect, and in that it has a culvert running through the centre of it. This culvert is necessary in order to carry the surface-water, which generally flows through the valley to the Medway. This again necessitated extra cost, and involved great forethought; for it had to be constructed so that it should carry an immense weight. It passes directly through the centre of the two artificial embankments, and thus underneath the whole length of the reservoir. I am glad to say that my example of embankment construction has been followed in the North of England by an engineer of eminence, who is constructing a reservoir with an embankment upwards of 100 ft. high, the rolling alone costing close on 6,000*l.*, which is money well spent, as the work is at once consolidated and the stability of the bank insured. Another wide departure from the ordinary method of construction was the adoption of an inner skin or layer of asphalte as the watertight material in lieu of clay-puddle, and, to my mind, there are several advantages in the adoption of asphalte. It is quite as cheap as clay-puddle; should a leak occur it can easily be found and stopped; it will prevent the growth of vegetable matter, and there will be no risk of the slopes being damaged by waves in rough weather. It has also a clean and neat appearance, and forms a fitting receptacle for filtered potable water. This plan of asphalting has also been adopted by an engineer in the construction of a reservoir to hold 12,000,000 gallons. The asphalting of the reservoir bed and slopes was done by Messrs. Bradshaw & Co., of London, in a manner that reflects the highest credit on them; they did in three months and a half the work for which six months had been allowed. No deviation from the contract plans prepared by me in 1880 was at all necessary. Every bit of work done can be found shown on those plans; and the "extras," as "extras" are understood, do not exceed the sum of 100*l.*, which is not much on a 30,000*l.* job.

SOCIETY OF ENGINEERS.

THE thirty-first annual general meeting of the Society of Engineers was held on December 14th, in the Reading-room of the Society, 6, Westminster-chambers, S.W. The chair was occupied by Mr. Charles Gandon, President. The following gentlemen were balloted for and duly elected as the Council and officers for the ensuing year, viz.:—As President, Mr. Perry F. Nursey; as Vice-Presidents, Prof. H. Robinson, Mr. A. T. Walmisley, and Mr. W. Schönheyder: as Ordinary Members of Council, Messrs. R. Berridge, W. Barns Kinsey, W. Macgeorge, Arthur F. Phillips, M. Ogle Tarbotton, Jonathan R. Baillie, R. W. Peregrine Birch, and John Standfield, the three latter gentlemen being new Members of Council; as Honorary Secretary and Treasurer, Mr. Alfred Williams; and as Auditor, Mr. Alfred Lass. The proceedings terminated by a general vote of thanks to the Council and officers for 1885, which was duly acknowledged by the Chairman.

The annual dinner of the Society was held on Wednesday evening last at the Guildhall Tavern, the President, Mr. Charles Gandon, in the chair.

The loyal and patriotic toasts having been duly honoured, General Bruce responding on behalf of the Army and Navy, and Major John

Aird, of the Engineer and Railway Volunteer Staff Corps, for the Reserve Forces.

The Chairman proposed the toast of the evening, "Success to the Society of Engineers." He congratulated the members upon the increasing numbers and usefulness of the Society, upon the excellent papers which were read at its meetings during last session, and upon the interesting and instructive visits which the members had made during the year to various important engineering workshops and works in progress. It was gratifying to be able to say that many men who had joined the Society as students were now occupying responsible posts in all parts of the world. With the toast he coupled the name of Mr. Alfred Williams, the hon. secretary and treasurer, who had served the Society in those offices since its foundation, thirty-one years ago.

Mr. Williams replied, making special reference to the value of the visits to works, facilities for which were so kindly afforded by the engineers-in-charge.

Mr. Arthur Rigg proposed "The President," and referred to the able manner in which Mr. Gandon had fulfilled his duties during the past year.

Mr. Gandon replied, expressing his gratification that he was to be followed by so able and well-tried a man as the President-elect, Mr. Perry F. Nursey, whose health he proposed. The toast was very warmly received.

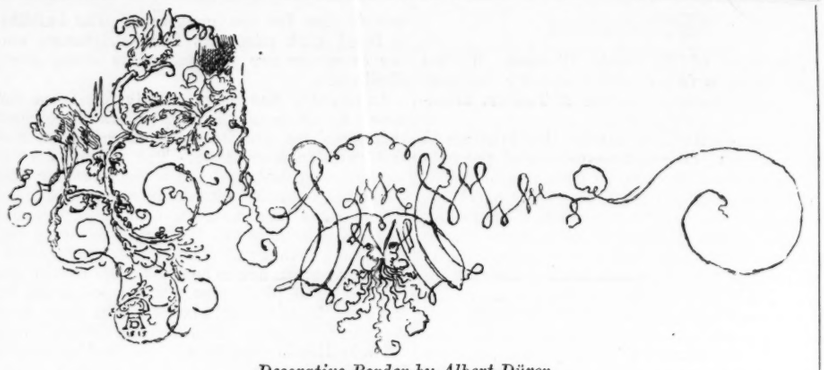
Mr. Nursey (Editor of *Iron*) replied in felicitous terms, thanking the members for having elected him to be their President, after twenty-eight years of official connexion with the Society. He had, in fact, served four apprenticeships in office,—firstly, as assistant hon. secretary, subsequently as secretary, and for the last seven years as a Member of Council. During the coming year he would do all in his power to advance the interests of the Society and of the profession.

The other toasts were "The Vice-Presidents and Members of Council," proposed by Mr. Aird and coupled with the name of Professor H. Robinson; "The Visitors," coupled with the names of Messrs. D. Baynes and W. Wainwright; and "The Secretary," Mr. C. J. Light, who was, unfortunately, unable to attend, owing to illness.

THE LATE MR. H. E. COE.

We announce with much regret that Mr. Henry Edward Coe, architect, died on Thursday, December 10th, after a painful illness. He was the son of Mr. Henry John Coe, solicitor, and was a pupil of the late Sir G. G. Scott at the same time as the late George Edmund Street. When quite a young man he obtained the honour of being placed first in the competition for the Foreign Offices, for which he obtained a premium of 800 guineas, but he was not allowed the privilege of carrying out this work, which fell to the lot of the late Sir G. G. Scott. More recently Mr. Coe gained the second premium (500 guineas) in the Glasgow Municipal Buildings competition. He was at various times in partnership with the late Mr. Frederick Peck and the late Mr. Stephen Robinson, and at the time of his death with Mr. Arthur Catt, who was a pupil of his, and who, with Mr. S. R. J. Smith (who has also been connected with the office for some years) intends to carry on the business. The late Mr. Coe has, in conjunction with the aforesaid gentlemen, or by himself, carried out many works of importance, including the Agricultural Hall, at Islington (in conjunction with Mr. Peck); Parochial Schools at Norwood, for the parish of Lambeth; Devon and Cornwall Hospital, Plymouth; Trent College, Derbyshire; the Guildhall, Cambridge; the Female Orphan Asylum at Beddington; and a number of other public institutions, together with churches, schools, mansions, &c. The new National Agricultural Hall, at Kensington (of which we recently gave illustrations) is now being erected from his designs. Mr. Coe was fifty-nine years of age at the time of his death. His remains were interred on Wednesday last at Highgate Cemetery.

The Art Journal.—The January number of this journal will contain an article upon the forthcoming representation of Goethe's "Faust," from the pen of Mr. Joseph Hatton. It will be illustrated with engravings taken from sketches made for the scenery by Messrs. Telbin & Craven.



Decorative Border by Albert Dürer.

DECORATIVE SKETCH BY ALBERT DÜRER.

In the article on "The Decorative Work of the Early German Engravers" last week (p. 618), reference was made to a collection of decorative sketches by Albert Dürer for book margins, and other such subjects, collected and edited by Obernetter. The accompanying illustration is a reproduction from a tracing of one of these, somewhat reduced in size, and may be of interest as an example of this class of Albert Dürer's work, which is not much known.

ST. JAMES'S CHURCH, TAUNTON.

Extensive additions at the east end of this fifteenth-century church have just been made. Notwithstanding its large and magnificent western tower, the body of the church is poor. In plan it comprises a nave and aisles, all under span roofs, with a south porch, the whole rather modernised. The easternmost arches of the nave are modern, and much wider than the others, as, some forty years since the greater portion of the Mediæval chancel was thrown into the nave, and an arch of brick, covered with Portland cement, built over the entrance to the sanctuary. The pseudo-chancel was, in fact, only 12 ft. long, and a small vestry then built, is now pulled down. It was obviously impossible to bring back the old condition of things, as the recent improvements had to provide for no diminution in the number of sittings (for about 880), notwithstanding the pulling down of the large galleries in the north and south aisles. Consequently, an entirely new chancel has been built, 40 ft. long, of the same width as was the ancient one, having a handsome lofty moulded stone chancel-arch. A spacious organ-chamber and choir-vestry, 23 ft. long by 17 ft. 3 in. wide, and a clergy vestry, 17 ft. 9 in. by 11 ft. 3 in., have been attached to the north side of the chancel. On the south side an aisle has been built, divided from the chancel by two arches. The east windows of the former chancel and south nave aisle have been carefully re-built further east, as well as the old piscina, after conservative repair. In order not to unnecessarily disturb any ancient part of the structure, the modern glass from the east window of the north aisle has been removed, the old stanchions and saddle-bars being left. The space under the window has been pierced with an ornamental stone screen, following the vertical lines of the windows above. The space at the east end of the north aisle, lately occupied by the organ, is now devoted to seats. The interesting old font has been removed to a more suitable position under the tower, and set upon a proper stone platform. The old oak Jacobean pulpit has been cleared of its varnish and paint, and reset at a lower level, upon a base of Bishops Lydeard red sandstone, with white lias coping to the Keinton stone steps. An oak Litany-desk, from the architect's design, has been added. From the same level to that of the footpace on which the altar stands are seven steps, the greater number of them placed eastwards of the choir-seats. The prayer-desks and choir-seats are of English oak. A credence of Pennant stone has been fixed within the sanctuary. An elaborate panelled English oak altar has also been carried out. The pavements to the chancel and south chancel aisle are of Godwin's encaustic tiles, specially designed by the architect. The windows not supplied with painted glass are now filled with cathedral rolled glass of various tints in geometrical patterns, and there are arrangements of glass of somewhat like character to several windows in the body of the building. Wagon-headed ribbed and panelled English oak ceilings have been put to the chancel and south chancel aisle with carved pateras. The former also has a rich cresting, and over the sanctuary is ornamentally cusped. Designs and working drawings have been prepared for handsome oak screens under the chancel arch and side arches, but at present sufficient funds are not forthcoming. It is also in contemplation to put new oak boarded and panelled ceilings to the body of the church in place of the present lath and plaster ceiling and cement ribs. A reredos of suitable character with the church is likewise thought of.

A design has been prepared for a handsome oak screen and lobby to the west entrance of the tower in place of the present poor deal lobbies. Handsome oak benches and bookboards standing on a platform have been placed at the west end of the nave on the north and south sides for the official use of the churchwardens.

The main material of the walls is the same as the old part of the church,—rough local stone with Ham Hill freestone dressings. The new roofs are covered with Delabole slates and red Bridgewater ridge tiles. The architect was Mr. B. Edmund Ferrey, F.S.A.; the clerk of works, Mr. Charles H. Webber, of Taunton; and the builder, Mr. John Pearse, of Minehead.

ARCHITECTURAL SOCIETIES.

Royal Institute of the Architects of Ireland.—The annual general meeting of the members of the Royal Institute of the Architects of Ireland was held on Saturday afternoon, in their offices, 37, Dawson-street. Mr. T. Drew occupied the chair. The other members present were:—Messrs. J. R. Carroll, J. L. Robinson, Parke Neville, R. Langrishe, C. A. Owen, C. Geoghegan, W. Stirling, W. K. Parry, J. J. O'Callaghan, W. Mitchell, J. Fullerton, G. Ashlin, S. Symes, hon. treasurer, and A. E. Murray, hon. secretary. The election of officers for 1886 was the first business proceeded with. The following gentlemen were elected:—President, W. H. Lynn, Belfast; hon. secretary, Albert E. Murray; hon. treasurer, Sandham Symes; Council, Parke Neville, J. J. O'Callaghan, J. R. Carroll, George C. Ashlin, Thomas Drew, Charles Geoghegan, James H. Owen, William Mitchell, Thomas N. Deane; auditors, H. R. Newton and T. M. Deane. The following gentlemen were elected Fellows:—W. H. Byrne, Samuel Close, W. H. Lynn, T. N. Deane, J. F. Fuller, J. L. Robinson, and D. F. Freeman. Mr. Murray read the report, which, after expressing regret at the death of Mr. John M'Curdy, the late President, went on to refer to the growing tendency of the Government in this country to get works, such as the building of post-offices, national schools, coastguard-stations, piers, &c., carried out by their own officials. This was a practice which had not been followed in Ireland until of late years, and was not at all followed in England. The works at the Royal University had been carried out by the Board of Works instead of by the profession. The Council had this subject under consideration, and proposed at a near date to bring it vigorously forward. Mr. Symes read the financial report, from which it appeared the financial condition of the insti-

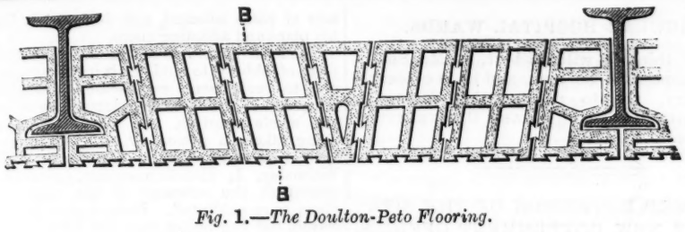


Fig. 1.—*The Doulton-Peto Flooring.*

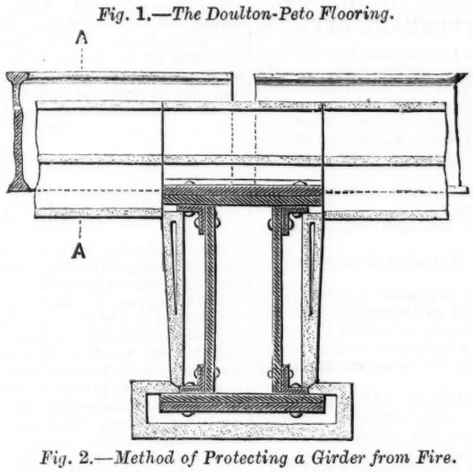


Fig. 2.—*Method of Protecting a Girder from Fire.*

tute was satisfactory. The reports were adopted, and votes of thanks passed to Mr. Murray and Mr. Symes for the able manner in which they had filled their respective offices during the past year. Mr. Fullerton, Armagh, read a paper on "The Better Protection of the Profession." He urged the necessity of architects being registered with the Institute, so as to prevent in some measure the growing tendency of builders and other unqualified persons imposing on the public, and bringing the real professional men into contempt. He cited numerous instances where unqualified men had been blindly employed by the public, who were afterwards obliged to call in qualified men to correct the mistakes which had been made. In the evening the annual dinner was held in the Grosvenor Hotel.

Birmingham Architectural Association.—The second ordinary meeting of the current session was held on Tuesday evening last, at Queen's College, Mr. John Cotton, Vice-President, in the chair. Mr. J. A. Cossins read a paper entitled "Notes on Warwickshire Churches," which was copiously illustrated by photographs, pen and pencil sketches, &c., mostly by the author's own hand. A vote of thanks was unanimously accorded to the lecturer. Mr. Cossins, in responding, deplored the modern system of restoration, and very kindly acceded to the request of the members to conduct a visit during the coming summer to some of the churches referred to. The following gentlemen were elected members of the Association:—Messrs. F. B. Peacock, F. Evans, F. B. Andrews, J. Irwine, E. Wilkes, E. H. Bewlay.

York Architectural Association.—The members and friends of the York Architectural Association held their third annual *conversazione* in the Water-colour Galleries of the Fine Art Exhibition on the 11th inst. During the evening the President of the Council (Mr. A. Pollard) who was supported by Mr. W. G. Penty (past-president) and other officers, delivered an address, and the prizes were distributed. The President, who was warmly applauded, said the result of the competitions for prizes was greatly to the credit of the winners, who had produced some good work, though there still existed a want of enthusiasm amongst members eligible to compete for prizes.

Access to St. James's Park from Charing Cross.—At the meeting of the Metropolitan Board of Works this Friday, the 18th inst., the Works and General Purposes Committee will present a report recommending "That a letter be addressed to her Majesty's Government, asking, with reference to the proposed new Admiralty and War Offices, that a public roadway may be formed in a direct line with the Strand to the Mall of St. James's Park, in accordance with the suggestion made by a deputation from this Board to the First Commissioner of her Majesty's Works, &c., in June, 1882."

FIREPROOF CONSTRUCTION.

IN our account of the Sanitary Exhibition held at Leicester two or three months ago,* we referred to a new form of construction for fireproof flooring, exhibited by Messrs. Doulton & Co., of Lambeth, which has been named the "Doulton-Peto Flooring." It consists, as we then said in effect (and as will be seen by the accompanying diagram, fig. 1), of a number of fireclay voussoirs, made hollow, and keyed together as shown, the end pieces or voussoirs being so shaped as to pass round and over the lower flanges of the iron joists, so as to protect the latter from the action of fire. The rebates or grooves left in the sides of the blocks are filled flush with cement immediately before fixing, and the surfaces of these lines of cement come in contact, so that on hardening a good cement key is afforded. The grooves left in the soffits of the blocks are to afford a key for the plastering. This method of flooring has been used throughout at the new London Pavilion Music Hall, Piccadilly, and with such facility, we are informed, that the builders, Messrs. Peto, were enabled to lay the wood flooring above the blocks and to cover the soffit with plastering simultaneously, thus saving time. This method of fireproof flooring is, moreover, as may be inferred, very cleanly in construction.

The following diagram (fig. 2) shows Messrs. Doulton's system of covering main girders by terra-cotta soffit-pieces and side slabs. This does not need detailed description, but, as will be seen by the diagram, air-spaces are provided so as to act as non-conductors of heat. These air-spaces, it is urged, have also the advantage of being available for purposes of ventilation, as holes may be made in any part of the slabs without injuring their stability, but with considerably diminished effectiveness, without doubt, in their primary object,—that of protecting the girders from the action of fire. Messrs. Doulton make no claim to have originated the principle of encasing the iron-work of a building with terra-cotta. Indeed, as our readers know, Mr. Waterhouse has protected the iron girders and columns of the new Natural History Museum by encasing them with that material.

BUSINESS PREMISES, LEWISHAM.

SIR,—A slight error occurred in your issue of the 14th ult. [p. 697] in the description of "Business Premises, Lewisham High-road." The article should have stated that they have been "opened by Messrs. Haycraft & Son, in connexion with their old-established business, Broadway, Deptford." Mr. G. E. Haycraft was responsible for their erection, and we find the discrepancy has caused a certain amount of misapprehension in some quarters. J. HAYCRAFT & SON.

Deptford Broadway.

* See *Builder*, p. 416, *ante*.

THE PROPOSED NEW CHARTER, R.I.B.A.

SIR,—Now that the Charter is recommitted one may expect a perfect document, although lawyers tell us that Acts of Parliament when finished by the draughtsman are generally better compositions than when they emerge from the Committee of the House, demonstrating, in fact, the truth of the adage "too many cooks." I must say I disapprove the action of the Council in sending out a draft of the proposed Charter some months before the commencement of the present session that all should study it, and then a few days before the opening day to send round another. I gave much attention to the first and had not sufficient time to study the second. The course is very suggestive of what so frequently occurs with men eager to accept office, yet leave the work to be done by two or three who attend with regularity, and then, appearing like comets on the scene, brandish their fiery scimetars, upset and confuse what has been done, and perhaps better done, by their steadily working colleagues who have mastered the subject.

The Associates supported the proposed Charter loyally, as they will be largely and very properly benefited. They are a numerous class, mostly youthful, and those of us who are no longer young feel a pleasure in helping them. But they should not ask too much. I mean, they should not rebel at the proposed restrictions which deny them the power of voting for the election of Fellows and the passing of By-laws. Equality of voting power is too communistic. It may be objected that this voting for Fellows and By-laws is a money qualification, but something more is involved. It is a question of professional grade. It leaves something to work for, is a stimulus to ambition, and a hostage for propriety of deportment. For example, if members of the, so to speak, lower house deport themselves improperly, by excluding them from the class of Fellows a penalty is inflicted which may have a salutary influence.

The question of amalgamating all provincial societies with the Institute is a cherished wish with me, and I hope a majority of the profession will insist on the introduction in the new Charter of a clause embodying it. Some see difficulties. I see very few,—in fact, none that cannot be coped with. When Germany was divided into a number of small kingdoms, each having its own system of passports and commercial regulations, it took longer to conform to the various requisitions before passing from one state to another than it does in these days to try a man and execute him for a capital offence; and equally obstructive were the laws regulating trade. But the Zollverein banished all impediments; the exigencies of trade and the needs of the community were deemed of far greater import than obedience to antiquated customs: so the Prussian Commercial Union became a fact and a boon, and the several States followed one code of laws. With equal ease may the difficulties in amalgamating the central body of architects with the provincial bodies be met.

Each architectural society in the provinces has been established or its own lines; but why may not these lines be changed so as to harmonise with those of the Royal Institute of Architects? Life is made up of compromises, and in dealing with this federation scheme, each must make concessions if they can be shown to be reasonable. Possibly something may have to be said on the "quantities" question. That need not be imported into the new Charter, but may be dealt with in the By-laws. As we are now a kind of *untied* states, let us endeavour to become the opposite. If some of the chief provincial societies will set the example, others may follow, and those who refuse to modify will pay the penalty of isolation. Time is the cure, and when it is felt that individual action is unfettered, and that we as a professional brotherhood are merely following generally accepted laws, which may add to our professional status, the instructed public will employ only the chartered men. Those who keep aloof will stand in the same relation to the holder of the Institute's certificate as the compounder of a patent medicine stands to the medical practitioner who holds the indisputable certificate to practise.

Dec. 9, 1885. T. E. KNIGHTLEY.

*** Postponed from last week for want of space.

"SUTTON'S HOSPITAL IN CHARTER-HOUSE."

Sir,—As an "old Carthusian" I have read your article on "Sutton's Hospital" [p. 811, *ante*] with the deepest interest, and I look forward to your promised further description of our old school.

I may supplement your interesting notes on the buildings by explaining that in my school-days (1851-7) our buildings surrounded "Upper Green," where our cricket matches were played; on the north side of this was a "hill," on which our school-room stood,* and beyond this was "Under Green," the great irregular space sold by the Merchant Taylors after their purchase of it, and now built over. It is "Upper Green" which interests us specially. That great square space was the cloister court of the Carthusian Monastery, and on its west and east sides were existing in my time (and I hope still exist) some of the ancient doorways of the monks' cells, with the small arched apertures through which meals were passed to the occupants from the cloister alley, just as I have since seen at the Monastery of the Grand Chartreuse, and as Viollet-le-Duc gives them in his "Dictionnaire d'Architecture." The best-preserved remains were in the later brick cloister (where we played football under difficulties!) near "Middle Friars," but I trust that others still exist in "Crown Walk," so called from the white crown painted up on the wall by Lord Ellenborough when (as my grandfather used to tell me) the boys of his day played at coach-and-horses, and there "changed horses."

I am inclined to think that the Carthusian monks' chapel stood on the "hill," and where as tradition says the bodies of those who died at the Great Plague were buried. This would agree with the usual Carthusian plan. Certain it is that our present chapel is of much later date and was most likely built by the Howards in connexion with their house. Yet this chapel is to us Carthusians of surpassing interest, for there is our founder's tomb, "good Richard Sutton," and there we meet for evening prayer on our founder's birthday (December 12) before we dine in our old hall. The chapel and Howard House stand on the south side of "Upper Green." The former is characteristic of that date (James I.), and has a double aisle lighted by windows placed high in the wall with a round-arched arcade; the tomb of the founder is in the north aisle. Though I used to sit in it I could bear without much emotion to hear that the ugly modern projection northwards from the Sutton aisle was to be removed. It is incongruous, and spoils the old proportions of the chapel.

The old hall is of the Howard date, but was much altered when it came into Sutton's hands. He added a quasi-clearstory, put on a new roof, and constructed a music gallery and screen, with panelling and chimneypiece, over which is a side gallery from end to end; very curious in effect.

Howard House, with its beautiful mullioned windows, and tapestry-covered walls, is well known; and we Carthusians remember its state-room, used for our singing lessons, under Hullah then, and for the "Oration" which we all had annually to go and hear, before its delivery in the Hall.

The older Carthusian relics are not so familiar to the general public, but, as an essential part of our history, of which we are so proud, I am sure that I only express the earnest wish of old Carthusians that they may never disappear for any consideration whatever.

We who were present on Thursday last in the old Hall, heard, with profound interest, after dinner, the extensive scheme of the Governors; it was explained in detail to us by the Master, and, though we appreciate the sense of duty in the Governors to extend Sutton's Charity as largely as possible, we regret the necessity of the sweeping away of any of our old buildings. One, however, feels that, in the hands of such truly "conservative" Governors as the Attorney-General and Mr. J. G. Talbot, all possible consideration will be given to old traditions. Yet one also feels sad to think that by this proposed scheme, the "adsum" to their Master will not in future be said by Sutton's pensioners within the sound of their old chapel bell.

R. Herbert Carpenter.

* The quoins and other stones of the old school, covered with names of old Carthusians, are removed and re-fixed at the new buildings at Godalming.

CIRCULAR HOSPITAL WARDS.

Sir,—I think it will be best, as Mr. Snell's feelings appear to be hurt, and he is evidently very angry, not to pursue this discussion further with him. Henry C. Burdett.

December 17th, 1885.

PROPOSED EXTENSION OF THE SITE FOR THE NEW GOVERNMENT OFFICES.

Sir,—Born and bred in London, and having some practical acquaintance with architecture, I have watched with great interest all metropolitan improvements for some years, and should like to add one word in support of the recommendations of Mr. E. C. Robins on the above subject, so clearly illustrated by the plan given in your paper of Nov. 21st last.

The combination of advantages that would be gained by its adoption, viz.:—

1. The continuation of the Mall into Charing-cross.
2. The widening of the Whitehall thoroughfare at its narrowest part.
3. The extension of the Whitehall façade of the new buildings, which would so largely enhance the general effect of the structure; as well as
4. The great increase of light and wholesomeness that would be secured by the enlargement of the open courts and areas,—

would, I believe, if sufficiently laid before, and realised by, the public, easily reconcile them to the increased cost; while the proposed dodging of the new building round the back of the two banks (which it would nevertheless dwarf into unpleasant insignificance) must, if carried out, be a source of intense regret to all future generations.

In numberless cases the avoidance of an immediate outlay has proved to be false economy, and produced the more dissatisfaction because it has ultimately led to greatly increased expenditure.

As a second change in the headship of the Office of Works has taken place, there seems some hope of an alteration in the accepted plan being made, and if the new First Commissioner would give an impartial consideration to Mr. Robins's proposals, and adopt them, probably many would not regret that through the fortune of political warfare this great decision, at any rate, has come into the hands of an Irish representative. Henry Staines.

"OVERCROWDING IN LONDON."

Sir,—In the otherwise excellent report of the discussion on the paper read to the Association of Sanitary Inspectors on "Overcrowding in London," published in the *Builder* of the 12th inst. [p. 841], I am reported to have said:—"Architects seemed to think they had an exclusive privilege to construct dwellings," &c., and on that sentence I am favoured with a foot-note expressing surprise that a sanitary inspector should be so ill-informed as not to know that 95 per cent. of the dwellings of London are built by speculating builders, and not from the plans or under the supervision of architects.

Having had a large experience in the building trade, and also in practical sanitation, I shall be glad if you will be good enough to allow me to say that the absurdity of such words is as evident to me as to you; and, that they are not mine. What I pointed out was, that *any one* is privileged to construct dwellings wherein the rooms may be as small as he pleases; that there is no restraint of law as to dimensions, save that ceilings must at least be 7 ft. high; and I pointed out that this privilege is very much abused all over London,—may I add, abused not only in the construction of so-called "Models"; but also in the construction of an enormous proportion of the houses built and being built in and around London?—the space suitable for one room being generally divided into two or more rooms, in which elbow-room for families simply does not exist.

I venture to hope the time is not far distant when the full gravity of the evil consequences involved in penning up a great population in rooms utterly inadequate in size to the requirements of a home, shall be better understood, and its further extension prevented by an enactment prescribing a minimum superficies of floor and ceiling, and a minimum proportion of length to width (where the sides are not equal) for all rooms intended for human habitation.

Hugh Alexander,
Chief Sanitary Inspector, Shoreditch.

BIRKENHEAD ABATTOIRS COMPETITION.

Sir,—From the articles and letters which have appeared in the local papers it is clear that a grave injustice has been done to the architects who have sent in the plans. First, by inviting them to compete, when, at the same time, the decision to employ a certain architect had been determined. Secondly, by the farce of calling in professional assistance, and ignoring it when it was found that the architect who had been determined upon was not represented among the three sets of plans selected, and deliberately bringing in his plans and adopting them.

The local papers do not hesitate to refer to it as a piece of jobbery, to condemn it in the strongest terms, and to recommend competitors to combine in a memorial to the Council asking them to reconsider the whole question. In view to such a course being taken, a notice to competitors to send in their names to "A. B. C.," care of Broom & Walmsley, 1, Hamilton-square, Birkenhead, was posted at the entrance to the room where the plans were exhibited. Some names have been received, but the notice may not have been seen by all competitors. Will you, therefore, permit attention to be drawn to it through the medium of the *Builder*? The memorial is being prepared and will be sent for signature to every competitor whose name is received.

One of the Competitors.

THE VENTILATION OF PRIVATE DWELLINGS.

Sir,—Referring to your report of the paper on the above subject [p. 839], read at the last meeting of the Architectural Association, I have evidently quite failed to express my meaning with regard to inlets and outlets in a system of ventilation. I do not by any means advocate the neglect of outlets; what I meant to say was that in a common-place house it was desirable to provide enough properly-arranged inlets, and then rather to leave the extraction to the natural agent,—the fire,—than to specially-contrived outlets, which are expensive, and uncertain in their action.

It was evident that on the evening of discussion one of the speakers (Mr. Slater) was under the same misapprehension as yourself, and I had thoughts of correcting his impression, but refrained, under the idea that but little importance would be attached to my views as a private individual; but as you have commented on them as those of the chairman, I venture to trouble you with this correction.

J. Alfred Gotch.

WHAT IS A "QUARRY"?

Sir,—I am much obliged for your remarks *re* above, but you misunderstand me: my question is not, what is the meaning of the word; but what is a quarry,—a quarry as known in the trade for the last half-century. You say:—"It thus appears that recent custom takes it to mean a diamond shape." By the enclosed glass merchants' list dated 1829, however, you will see that even at that date quarries were known as "quarries," and squares as "squares."

We all know that the word "square" is used daily for panes which are not square in the true sense of the word.

I have used the word "pane" in preference for five-and-twenty years: if no other, it has the one advantage of being shorter. If you could find space in the *Builder* to reprint the list enclosed I have no doubt it would interest many of your readers.

If some of your correspondents will kindly answer my query they will much oblige

Ten to the Foot.

*** The price list of 1829 referred to is hardly of sufficient interest to print, but it gives "quarries" as a separate item under the general head of "Prices of Crown Window Glass," and "squares" and "small squares" as two other headings.

FELT ROOFING.

Sir,—I should be greatly obliged if, through the medium of your paper, I could get information as to the experience of other people with regard to felt roofing. Does the smell ever quite go off? It is now three years since I added a library to my house,—a large room, with no others above it, having a high oak roof, boarded in, with felt over, and then slated. The builder and architect both told me the smell of tar from the felt would go off in a few months, but I have not found it so. In the summer and dry weather it soon became very little perceptible, but on rainy and damp days, of which we get a great many in the West, the strong gaseous smell of tar, which catches one's throat, is as powerful as ever, and renders the room quite uninhabitable at this season. Having a good fire makes things worse, as the heat seems to draw the smell down into the room. Is there any remedy?

F.

The late Sir William Siemens.—We understand that a biography of this eminent man is being prepared, at the desire of the executors, by Dr. William Pole, F.R.S., honorary secretary of the Institution of Civil Engineers, and author of the "Life of Sir William Fairbairn, Bart." We are asked to say that Dr. Pole will be grateful for the loan of any of Sir William's letters, or for any information of importance. Address, Athenæum Club, S.W.

The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.

XXIX.

THE HYPERBOLIC PARABOLOÏD.

THIS surface (fig. 225*) is engendered by *a straight line*, A, *sliding on two other straight lines*, B *and* B^1, *not contained in one plane, the straight line* A *remaining always parallel to a given plane*, P, which is called a *Directing Plane*. To produce a series of generators, A, we have only to cut the two directors, B and B^1, by planes parallel to the directing plane P; joining the points of intersection, M N, $M^1 N^1$, $M^{11} N^{11}$ . . . . ., we have the generators A, A^1, A^{11} . . . . . required.

This paraboloïd is a *skew surface*, for any two generators, A and A^1, cannot be in one plane, otherwise the directors B and B^1 would be in one plane.

This paraboloïd has also, like the hyperboloïd, *another system of generation*, in which the directors B become generators, which slide along any two lines, A, which then become the directors. We prove this by showing that any plane, D U V, parallel to the directors, B and B^1, cuts the paraboloïd along a straight line; this means that the intersections, D, D^1, D^{11}, of the plane with the generators A, A^1, A^{11} are in a straight line.

Let us project our figure on a plane, Q O X, parallel to the directors B and B^1; and let the lines of projection be parallel to the line P O (mind this is not an orthogonal projection, as those we ordinarily make, but an oblique projection on a plane, which need not be at right angles with the plan). Now, B and B^1 will be projected in b and b^1, and the lines M D N, $M^1 D^1 N^1$, $M^{11} D^{11} N^{11}$ will be projected on $m\,d\,n$, $m^1 d^1 n^1$, $m^{11} d^{11} n^{11}$, parallels to O X. We shall have, therefore, on account of the projection lines being parallels:—

$$\frac{M\,D}{D\,N}=\frac{m\,d}{d\,n},\quad \frac{M^1\,D^1}{D^1\,N^1}=\frac{m^1\,d^1}{d^1\,n^1},\quad \frac{M^{11}\,D^{11}}{D^{11}\,N^{11}}=\frac{m^{11}\,d^{11}}{d^{11}\,n^{11}}$$

but as the lines, A, A^1, A^{11}, are cut by three planes parallel to the plane Q, we have by the fifth proposition:—

$$\frac{M\,D}{D\,N}=\frac{M^1\,D^1}{D^1\,N^1}=\frac{M^{11}\,D^{11}}{D^{11}\,N^{11}}$$

and, therefore, the second members of the former equations are equal, and we have:—

$$\frac{m\,d}{d\,n}=\frac{m^1\,d^1}{d^1\,n^1}=\frac{m^{11}\,d^{11}}{d^{11}\,n^{11}}$$

As the lines $m\,n$, $m^1 n^1$, $m^{11} n^{11}$, are parallel, these proportions show that the points d, d^1, d^{11} are on a straight line; the points D, D^1, D^{11} are, therefore, in the projecting plane of the line d, d^1 d^{11}, and as the points D, D^1, D^{11} are also in the plane D U V, they are on the intersection of both planes, and are therefore in a straight line.

We can conclude, therefore, that if a line B, parallel to the plane Q, is made to slide on the two lines A and A^1, it will describe the same paraboloïd described before by the line A.

Now, if without requiring that the line B be parallel to a given plane, we slide the line B on three lines, A, A^1, A^{11}, parallel to a plane P; the line B will again engender the paraboloïd. From this point of view, the paraboloïd may be considered as a special case of the hyperboloïd of one sheet.

From the above we can conclude:—

Firstly. That through any point D of the paraboloïd two generators pass, the one of system A, the other of system B.

Secondly. That two generators of the same system are never in one plane.

Thirdly. That each generator of one system meets all the generators of the other system, but *that there are no two generators parallel*; for, if A^{11} and B^{11}, for instance, were parallel, they would have to be both parallel to O X intersection of the two directing planes. This is impossible; for by the very conditions of the surface, a plane which passes through B^{11}, and is parallel to O X, will be parallel to the directing plane Q, and can never intersect any other director B; therefore, can never give another point of a generator.

Fourthly.—A straight line can pierce a paraboloïd in not more than two points.

As the generators of the paraboloïd are found by the intersections of the directors by planes parallel to the plane P, we know by the fifth proposition that the parallel planes cut the lines B and B^1 in proportional parts; this gives us the following proportions:—

$$\frac{M\,M^1}{N\,N^1}=\frac{M^1\,M^{11}}{N^1\,N^{11}}=\frac{M^{11}\,M^{111}}{N^{11}\,N^{111}}=\ .\ .\ .\ .\ .\ .\ .$$

The surface of the paraboloïd might therefore be described by a line, A, *s iding on the directors* B *and* B^1 *in such a way as to cut these directors in proportional parts*.—This gives us an easy way of constructing a hyperbolic paraboloïd with four wood rails and a reel of thread. Make with the rails a skew quadrilateral of rigid angles, then divide each side in equal parts, and join the divisions on opposite sides of the quadrilateral with thread. From the last definition we see that each thread will be a generator of a paraboloïd, of which all the threads taken together will clearly represent the surface.

The tangent plane (fig. 225) to the paraboloïd in a point G is the plane of the two generators which pass through that point. We therefore produce a second generator, A^1, parallel to the directing plane P, and then cut both the generators A and A^1 by a plane parallel to the other directing plane Q, and passing through G; this gives us the second generator, G H K, required.

The section of the paraboloïd by a plane π (fig. 225) is found by marking on the generators the points where they are cut by the plane and connecting these points by a continuous line. The tangent to the curve of intersection will be, as in every other case, the intersection of the cutting plane π by the plane tangent to the surface of the paraboloïd which we find as above. But we can foretell beforehand what the nature of the section will be.

If the plane π contains a generator of the paraboloïd, the other branch of the section will be also a straight line; but if the plane π be parallel to the directing plane P, there would be but one straight line of section, viz., a generator itself.

Let the plane π be any plane not parallel to the directing planes, and its traces on those planes be δ and δ^1. We know that the paraboloïd will have generators parallel to δ and δ^1; for, if we take a plane, B C E, parallel to δ, it will cut the director B^1 somewhere, say in N^{11}; if through N^{11} you carry a horizontal plane, it will cut the paraboloïd along the generator A^{11}, which is parallel to C E and, therefore, to δ, that is parallel to the plane π. In the same way a generator of the B system may be found parallel to δ^1 and the plane π. The plane π will never touch the two generators which are parallel to it, the section must therefore be an open curve which will tend to touch the said generators at an infinite distance. This means *the section is a hyperbola*.

The limits (prop. asymptots) of the hyperbola are the intersection of the plane π by the planes tangent to the hyperboloïd at an infinite distance on the generators parallel to the plane π. These tangent planes are the planes which contain the generators, and are parallel to the directing planes; the limits are therefore very easily found.

If the plane π is parallel to the intersection O X of the directing planes, then *the section is a parabola*.

In fig. 226 we have represented the plan of a hyperbolic paraboloïd and two elevations, by which the reader will be able to realise the appearance of this surface. He will find it identical with that described before in fig. 98 (June 6th, 1885), for its outline on both elevations, or, what is the same, its sections by the vertical planes on $e\,c$ and $d^h f^h$ are parabolas and all other sections of the surface parallel to those planes are also parabolas, as they are all vertical planes parallel, as we will see, to the intersection of the directing planes P and Q; the surface may therefore be described as formed by *the motion of a parabola along another parabola at right angles with it*.

In our figure the two directing planes are supposed vertical, and their horizontal traces P^h and Q^h are given at the right-hand side of the plan; their intersection is, therefore, a vertical line. The horizontal projections of the generators of the paraboloïd will, of conrse, be parallel to P^h and Q^h. We have taken the lines $d\,c$ and $e\,f$ as directors, and drawn only one system of generators (few of the other system are indicated on the plan by broken lines), so as to allow us to show on the elevations by plain lines the parts of the generators which are seen, and by dotted lines the parts which are hidden by the surface itself.

We have cut the paraboloïd by three horizontal planes; one above the point o, which gives us as section the two hyperbolas that touch the points m and n; another horizontal plane taken below the point o gives a section formed of the two hyperbolas which touch the points u and w; the horizontal plane taken at the level of the point o cuts the paraboloïd along two straight lines, and is tangent to the surface in the point o. The point o is called *the crown of the paraboloïd*, and the vertical line $o\,x$ through o is called the *axis of the paraboloïd*.

THE TANGENT PLANES TO SKEW SURFACES IN GENERAL.

Of all skew surfaces, the hyperboloïd of one sheet and the hyperbolic paraboloïd are the simplest, and their tangent planes are very easy to find. They offer a means of solving similar problems on any other kind of skew surface, thanks to the two following propositions:—

First Proposition (fig. 227).—*When two skew surfaces* S *and* S^1 *have one generator*, G L M N, *in common and are* tangent *in three points*, L M N, *of that generator, then the two surfaces are* connected *all along that generator*. Two surfaces are said to be *connected* when they are continuous without any apparent joint; this implies that *in every point of their connexion the tangent planes will be common to both surfaces*.

As the two surfaces are tangent in the points L, M, N, any three planes taken through these points will cut both surfaces along curves A*a*, B*b*, C*c*, and A^1a^1, B^1b^1, C^1c^1 respectively tangent to one another; of these curves, the three first may be taken as the directors of the surface S, and the three last as the directors of the surface S^1. Now, if the generator, G, slides along an infinitely small distance, and occupies the position g, it will still be on both surfaces; for the directing curves of both surfaces have the same linear elements, L*l*, M*m*, N*n*, because they have the same tangents. We can conclude that the superficial element comprised between the generators G and g is *common to both surfaces* (mind, the superficial element is a skew surface, not a plane), and the *two surfaces a e* therefore *connected* all along the generator G.

Second Proposition (fig. 227).—If the two surfaces, S and S^1, have *directing planes*, they will be connected all along the generator G if they *are tangent in any two points*, L *and* M, *of that generator*, and *have both the same directing plane*. It is evident that in this case the line g will be sufficiently determined by having to be parallel to the directing plane, and to touch the elements, L*l*, M*m*; and we can conclude that the above conditions are sufficient for connecting the surfaces along the generator G.

The two preceding propositions on the contact of skew surfaces are not only useful in many questions of masonry and carpentry where skew surfaces have to be neatly connected, but they give us the means of producing the surfaces of the joints of certain vaults, for these surfaces must always be normal to the inner surface of the vault, that means perpendicular to the planes tangent to the vault in every point of the joint.

Find the plane tangent in a given point of a skew surface (fig. 228).—Let the curves A*a*, B*b*, C*c* be the three directing lines of a skew surface, S, and we wish to find the plane tangent to this surface in the point H, situated on the generator G L M N. Produce the tangents L T, M U, N V to the directing curves. If the generator, G, is made to slide on those tangents it will describe a hyberboloïd (the surface L T V N in fig. 228), which will be tangent to the surface S in the three points L M N, and, according to our first proposition, this hyperboloïd will be tangent to the surface S all along the generator G. This is a *connecting hyperboloïd*. The problem is therefore brought back to finding the plane tangent in the point H to the connecting hyperboloïd, a problem which we have learned to solve.

To find a *connecting hyperboloïd* we are not limited to the tangents on the directing curves given, but the tangent to any other curves delineated on the surface will do as well; in fact, we have the choice in each point, L, M, N, of any straight line belonging to the plane tangent in that point. This shows that there are an infinite number of connecting hyperboloïds, which touch a surface along a given generator; but of all these hyperboloïds there is one more closely connected with the surface

* Figs. 222, 223, and 224 refer to the preceding article.

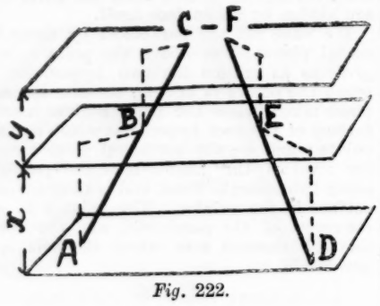


Fig. 222.

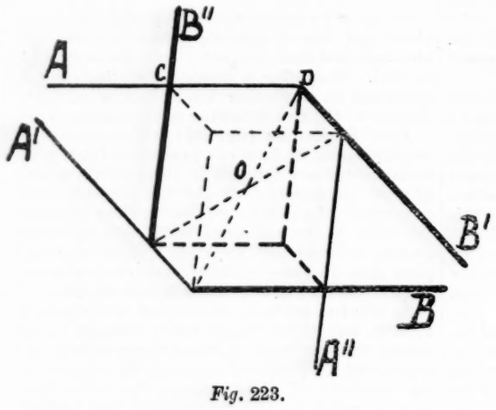


Fig. 223.

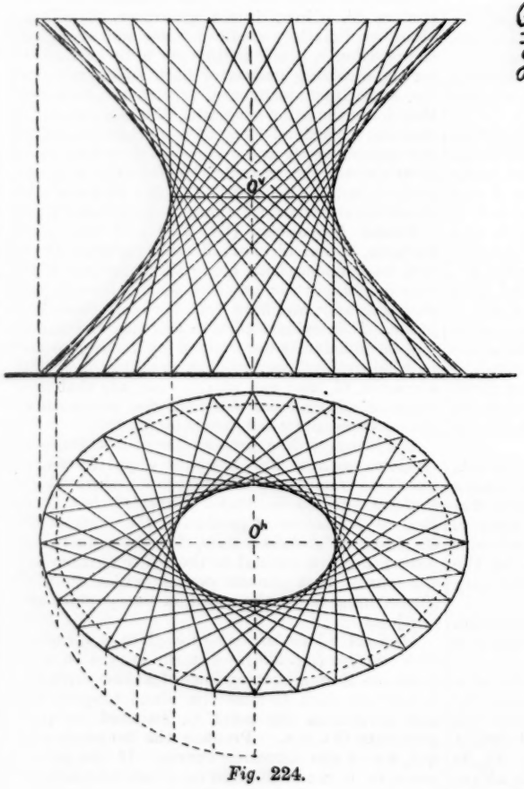


Fig. 224.

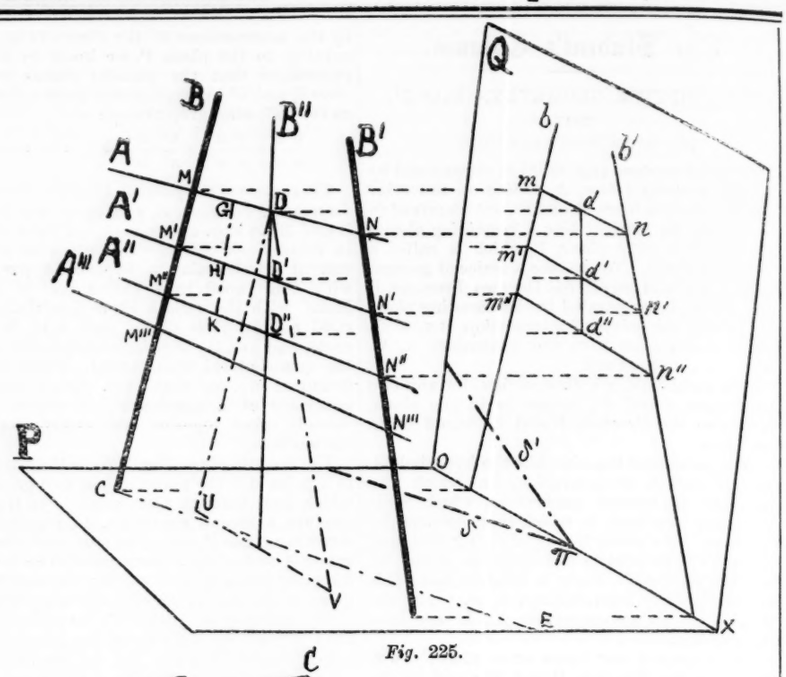


Fig. 225.

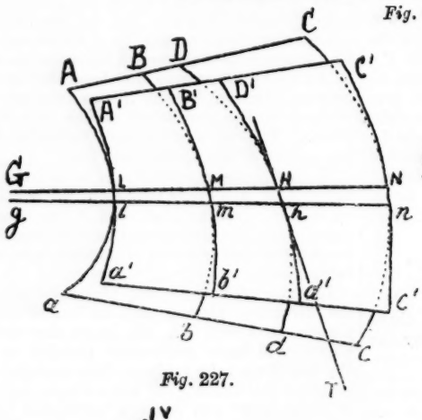


Fig. 227.

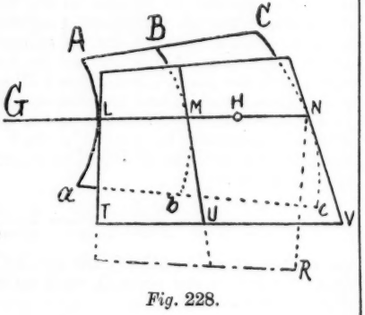
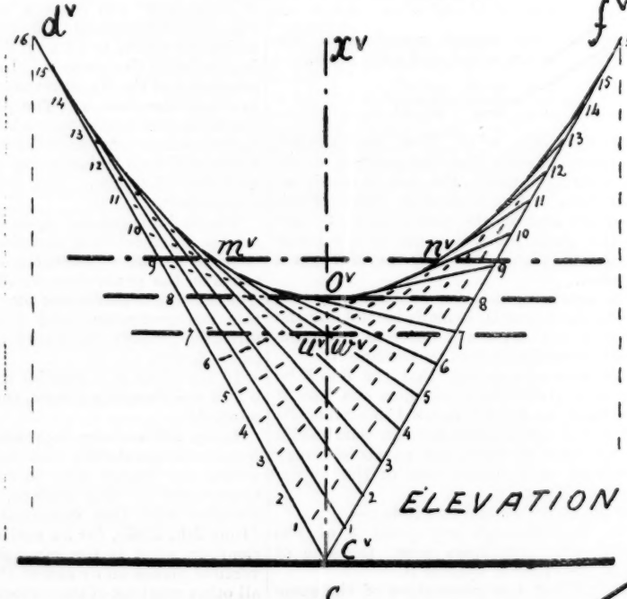


Fig. 228.



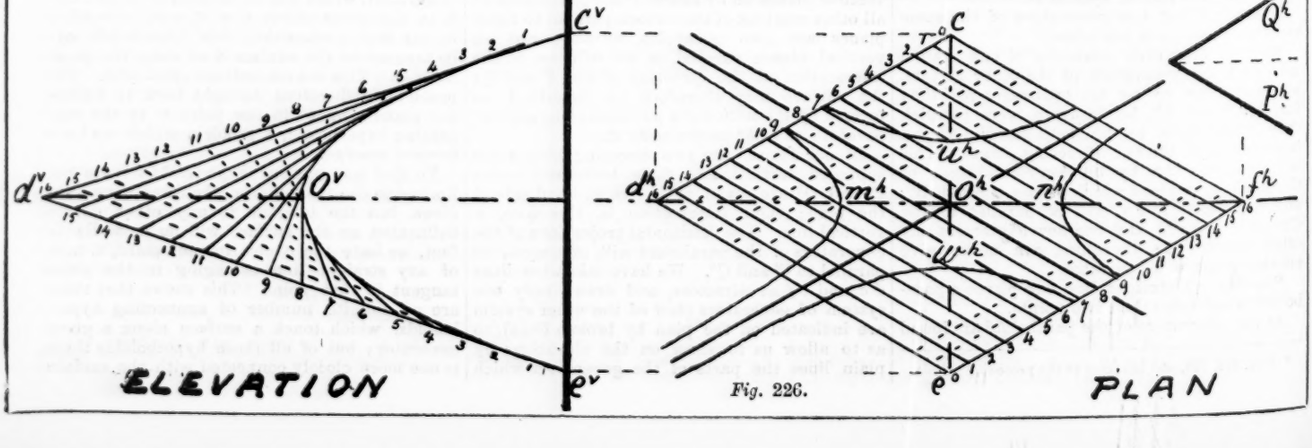


Fig. 226.

than all the others. This is what we call the *osculating hyperboloïd*, of which we shall speak when we treat of the curvature of surfaces.

The *connecting paraboloïd* offers the simplest method of finding a plane tangent to a skew surface, S. We can always (fig. 228) in the plane tangent to the surface S, in a point N, produce a line, N R, parallel to the same plane as the tangents L T and M U. To do this we have only to cut the tangent plane G N V by a plane parallel to L T and M U. If, then, we adopt the lines L T, M U, N R as directors, the connecting surface will be a paraboloïd, the tangent planes to which are particularly easy to find. We shall show further on a practical example: this method applied to finding the joints of a skew archway.

If the surface S be itself a cylindroïd, with a directing plane, the connecting paraboloïd will be constructed on the tangents L T and M U to the two directing curves. A practical example of this operation will be given further on, when finding the tangent plane to a conoïd.

STAINED GLASS.

Tatton Park.—The private chapel at Tatton Park, the seat of Lord Egerton, has just been completed, the windows round the chapel being filled with stained glass containing figure work, very delicately treated on white glass, silvery in tone, and golden stain. The details are strictly in keeping with the Renaissance style. The east window of three compartments is adapted from a fresco by Pietro Perugino at Pavia. These windows were designed and executed by Messrs. Heaton, Butler, & Bayne, under the supervision of the architect, Mr. A. W. Blomfield.

Kildwick (Yorks).—Stained glass has been inserted into one of the three-light windows in the south aisle of Kildwick Church, in memory of the late Richard Hartley, of Sutton. The subject is the Adoration of the Shepherds, and the work has been designed and executed by Messrs. Powell Brothers, of Leeds.

York.—A stained-glass window has recently been erected in the north aisle of St. Sampson's Church, York, as a memorial to Mr. Jacob Hird, who for forty-five years took part in the choir of this church, and from his youth to his death was connected with the Wilberforce School for the Blind, first as a pupil, and afterwards as teacher of basket-making. The subject chosen is our Lord calling Bartimeus, and is represented in two panels surmounted with canopies of rich Perpendicular work, with the texts, "He stood still and commanded him to be brought," and "Be of good comfort, rise, He calleth thee." The artist was Mr. J. W. Knowles, of York, who has executed five other windows in this church.

Liverpool.—The baptistery of St. Nicholas, Blundelsands, Liverpool, has just received an addition of three Munich windows, representing the Presentation in the Temple, the Good Shepherd, and the Baptism of Christ. They are exceedingly rich in tone, and very artistic in design. These windows are by Messrs. Mayer & Co., who have already erected a three-light window in the same church.

Rotherham (Yorkshire).—A two-light stained glass window has lately been erected in the church of Adwick-on-Dearne, near Rotherham, to the memory of "Betsy, the beloved wife of Mr. Christopher Norwood," of that place. The subject is "The good Shepherd." Messrs. Pitman & Son, of London, are the artists.

Post-Office Handbooks.—We have received the following circular from the Secretary of the General Post-Office:—"On the 1st of January next, a new official publication, entitled 'The Post-office Handbook,' containing the principal regulations and other necessary information respecting Post-office business, will be issued for sale to the public at the price of 1d. The book may be obtained at all Post-offices, and also of the town and rural postmen throughout the United Kingdom. The 'Post-Office Guide,' and other official publications, which have hitherto been supplied to the public through private publishers, will, after the end of the present year, be obtainable from Postmasters only. All persons, therefore, desirous of obtaining copies of the next issue, should make early application to the local Postmaster or sub-Postmaster for the same."

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,211, Coupling Carts. A. Steadman.

Two carts are coupled together to form a single wagon, the connexion being made by iron bars fixed to the body and bolted together, and by plates bolted to the sides of the body by long bolts. When the carts are disconnected and used separately, these bolts serve to assist in securing the removable shafts to the bodies.

12,097, Paving Block. J. Maclaren.

The top of the wooden block, such as is generally used for paving, is dovetailed to a metallic part, which may be grooved, channelled, or left plain as desired. The metallic portion forms the road-surface, and is channelled so as to prevent slipping and to drain off water, &c., from the roadway. Studs are inserted at intervals in the blocks used, so as to secure a uniform width of joint.

12,803, Material for Building, &c. E. Robbins.

Unground sulphate of lime is dehydrated by heat or pressure, in a suitable way, pressed into a mould, into which any suitable material may be first placed, to form the face of, or to be embodied in, the product, and the mass is indurated by the addition of water or an aqueous solution of any chemical, or by heat, or by pressure. The gypsum employed may be combined with any other ingredients, solid, liquid, or gaseous, such ingredients being of either a binding, a neutral, or a colouring nature. Various methods of carrying the invention into effect are described.

14,598, Frost Cocks for Hydrants. W. L. Baker.

To prevent water standing in the discharge-pipes of hydrants after the sluice is shut, and thereby causing bursting by frost, a cock or valve is fitted at the bottom of the bend to allow the water to run off. A plug-valve may be employed with a hole in the top, in which the turncock's hook may be inserted. Or the plug may be hollow and fitted with a balanced or loaded valve which opens automatically when the water pressure is shut off by the sluice.

14,717, Ornamental Surfaces of Metal, &c. A. Swan.

Producing ornamental surfaces of metal, combined with glass or other material capable of being pressed, cast, or moulded. The metal is formed with projections, grooves, or irregularities at the parts with which the glass or the like is to come in contact, and the latter is then cast or moulded thereon.

15,014, Artificial Stone. J. Thompson and J. H. Bryant.

Portland cement, crushed granite, and iron slag, are mixed together in certain proportions, and water containing sodium silicate is added, with or without a suitable pigment. The mass is then laid *in situ*, or made into slabs and allowed to set.

NEW APPLICATIONS FOR PATENTS.

Dec. 4.—14,374, R. Best, Construction of Central Light Gaseliers.—14,881, A. Carey and A. Jack, Manufacture of Portland Cement.—14,901, H. Rushbury, Improvements in Door Locks.—14,907, C. Hodges, Improved Lamp Post.

Dec. 5.—14,921, J. Sephton and J. Evans, Chimney Pots for Preventing Down-draughts.—14,951, J. Davis, Supporting Vertically Sliding Window Sashes and Shutters in their Frames.

Dec. 7.—14,977, C. Henderson, Fan for Producing a Current of Air.—14,978, J. Cartland, Ventilating Rooms and other Compartments.—14,981, W. Reed, Pneumatic Chimney-cowl and Ventilator.—15,001, J. Cant, Improvements in Ventilation.—15,003, E. Benn, Improvements in Chimney Pots.—15,007, W. Storey, Improvements in Fire-grates.—15,016, W. Berridge, Improvements in Stoves or Fireplaces.

Dec. 8.—15,031, W. Collis, Jointing Cast-iron or other Rain or other Water Gutters.—15,035, W. Scott Morton, Improvements in Fireplaces.—15,038, W. Collis, Ventilating Vertical Sanitary or other Water Pipes or Tubes.—15,044, D. Gill, Improvements in Room Doors and Doorways for Isolating the Air in Rooms from Passages and Staircases.—15,084, A. Ayers and W. Wilson, Sash Frames, Holders, and Casings for Windows, &c.—15,088, M. Buckner, Improvements in Windows.

Dec. 9.—15,097, C. McCarthy, Sash Fastener.—15,108, J. Gibson, Cooking Ranges and Stoves.—15,112, J. Armistead, Ventilating Rooms, &c.—15,133, L. Scott, Improvements in Glass Levels.—15,134, A. M'Lean and R. Smith, Improvements in the Preparation of Coloured Varnishes.—15,135, A. McLean and R. Smith, Improvements in the Manufacture of Pigments.—15,138, E. Banner, Fastening or Securing Coal-hole Plates, &c.

Dec. 10.—15,157, W. Stirling, jun., and T. Swann, Preventing the Flow of Solid Matter from Water-closets into Public Sewers or Water-course.—15,185, T. Carder, Improvements in Kilns.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,805, H. Phillips, Flushing Cisterns.—12,223, R. Wyatt, Syphon Flushing Apparatus for Cisterns.—12,392, C. Fellows, Improved Sash Fastener.—13,198, F. Caws, Ventilating.—13,758, E. Horsley Door and Window Fastener.—13,760, E. Horsley, Window Fasteners.—14,467, J. Jeffries, Improved System of Glazing.—14,538, D. Brown, Protecting the Astragals of Glass Roofs and arranging Channels for Condensed Water as part of same.—14,553, W. Brierley, Improvements in the Manufacture of Bricks and Tiles.—12,957, J. Sheldon, Improvements in Wood and other Screws.—13,078, C. Hunt Combined Reflecting and Ventilating Apparatus in connexion with Gas Lights.—13,100, E. Hughes, Apparatus for Feeding Timber to Circular or other Saws.—13,271, S. Sutcliffe, Tile Grate Fronts and Tile Grates and Chimneypieces combined.—14,347, C. Cordon, Apparatus for Propping or Staying Purposes in Building, Excavating, Quarrying &c.—14,559, R. Lee and J. Hodgson, Construction of Fireproof Pillars and Columns.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

695, W. Hacking, Improved Portable Soldering Apparatus.—884, B. Mills, Process for the Agglomeration or Consolidation of Materials, and for Hardening Stone Cements, &c.—1,538, W. Brew, Apparatus for Regulating and Adjusting the Opening of Casements, &c.—2,451, M. Brissac, Industrial Product for Panels and Hangings in Relief.—12,926, A. Boult, Door Checks.—12,927, A. Boult, Door Checks.—1,355, G. Campbell, Improvements in Fire Grates.—1,388, A. Reddie, Machine for Sharpening and Setting Saws.—1,777, G. Chubb and G. Exton, Door Locks, Latches, and Furniture.—2,092, A. Campbell and J. Ash, Improvements in the Catches of Door Locks or Fastenings.—3,396, H. Sairs, Improvements in Hinges.—11,805, H. Phillips, Improvements in Flushing Cisterns.—11,890, H. Haddan, Improvements in the Treatment of Veneers.—12,903, W. Lake, Improvements in Doors, and Hanging and Closing the same.—13,730, C. Knight, Improved Means for Jointing Pipes.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

DEC. 3.

By Messrs. ELGOOD.

Russell-square—No. 27, term 16 years, ground-rent 42*l.*	£1,400
2, Torrington Mews, 20 years, ground-rent 6*l.* 6s.	150

By NEWBON & HARDING.

Barnsbury—82, Thornhill-road, 23 years, ground-rent 6*l.*	270
Canonbury—88, Grosvenor-road, 64 years, ground-rent 10*l.* 10s.	1,130
5, Alwyne-road, 60 years, ground-rent 10*l.*	730

DEC. 4.

By W. B. HALLETT.

Walham Green—14 and 16, Armadale-road, 87 years, ground-rent 10*l.*	445

DEC. 7.

By Messrs. LEAGE.

Fulham—50, 52, and 54, Radipole-road; and 45, Cheshilton-road, 94 years, ground-rent 32*l.*	1,800

DEC. 8.

W. F. NOKES.

Islington—26 add 27, North-road, 75 years, ground-rent 16*l.* 10s.	850

By VENTOM, BULL, & COOPER.

West Kensington—62, Talgarth-road, 91 years, ground-rent 10*l.* 10s.	650
39 and 41, Gwendwr-road, 91 years, ground-rent 24*l.*	1,700
61, Gwendwr-road, 91 years, ground-rent 15*l.*	850

DEC. 9.

By INMAN, SHARP, & HARRINGTON.

Forest Hill—Ground-rents of 14*l.* a year, reversion in 71 years	350

By HARDS & JENKINSON.

St. Vincent—"The Belvedere and Brighton Sugar Estates," 616 acres	2,000
"The Calder Sugar Estate," 550 acres	3,300
"The Argyle Sugar Estate," 405 acres	3,500

By W. & F. HOUGHTON.

Upper Clapton, Hill-street—Two freehold houses	2,060

By A. & A. FIELD.

Bexley Heath—Freehold house and stabling	450
Bermondsey—122, Alscot-road, 47 years, ground-rent 4*l.* 10s.	380

DEC. 10.

By BEADEL & CO.

Brixton—396 and 398, Coldharbour-lane, area 4,600 ft., freehold	970
Staines—Freehold land, about 20 acres	1,200
Essex, Blackmore — Copyhold cottage, and 3a. 2r. 32p.	145
Stonden Massy—Freehold land, 5a. 3r. 28p.	135
Blackmore—Four freehold allotments, 0a. 1r. 18p.	34

By FAREBROTHER, ELLIS, CLARK, & CO.

Barnes—5 to 8, Rose Cottages, freehold	485
10, John's-row, freehold	125

By C. C. & T. MOORE.

Limehouse—61 to 69 odd, Lime-street, 83 years, ground-rent 30*l.*	400
St. George's-in-the-East—11 to 25 odd, Anthony-street, 26 years, ground-rent 16*l.* 18s. 4d.	1,375
31 and 33, Anthony-street, 25 years, ground-rent 5*l.*	335
20, 21, 25 to 28, Upper Fenton-street, 24 years, ground-rent 12*l.*	715
252, 254, and 256, Cable-street, 56 years, ground-rent 9*l.* 9s.	775

By E. STIMSON.

Brixton—11, Frederick-crescent, 75 years, ground-rent 5*l.* 10s.	290
155, Brixton-road; and 30, 32, and 34, Cowley-road, 15 years, ground-rent 25*l.*	650

Oxford-street—218, Great Portland-street, 3¼ years, ground-rent 15*l.* £920
Chelsea—23, Stayton-street, 23 years, ground-rent 4*l.* 6s. 105
Forest Hill—46, Ewart-road, freehold 250
Camberwell, Artichoke-row—A plot of land, area 7,000 ft. 620

Dec. 11.

By Horncastle & Pember.

Limehouse—15, Maroon-street freehold 165
115 and 117, Maroon-street, freehold 660
Poplar—21 and 23, Grundy-street 32

By Willats & Charlton.

Clerkenwell—11, Myddelton-square, 26 years, ground-rent 10*l.* 425

MEETINGS.

Saturday, December 19.

Crystal Palace School of Engineering.—Award of Certificates to Students. Sir F. A. Abel, F.R.S., in the chair. 1 p.m.

Monday, December 21.

Lambeth Potteries.—H.R.H. the Prince of Wales will present the Albert Medal of the Society of Arts to Mr. Henry Doulton. 12 noon.
Inventors' Institute.—8 p.m.

Tuesday, December 22.

Institution of Civil Engineers.—Mr. John Milne "On Construction in Earthquake Countries." 8 p.m.

Wednesday, December 23.

Edinburgh Architectural Association.—Annual dinner.

Miscellanea.

Liverpool Engineering Society. — The usual fortnightly meeting of this society was held at the Royal Institution, Colquitt-street, on the 9th inst., when the President, Mr. W. E. Mills, delivered his retiring address, which took the form of a short review of the art of engineering, looked at in the threefold aspect—first, what it had been in the past; second, what it is now in the present; third, what it is likely to be in the future. The concluding portion of the address was devoted to considerations on the education best fitted for those who intend to become engineers. The want of technical schools throughout the country, of which Sir William Fairbairn had pointed out the necessity more than thirty years ago, was strongly commented upon, while the appointment of a Professor of Engineering at University College was regarded with much satisfaction as a step in the right direction, and all (especially students) were urged to avail themselves fully of the advantages offered by means of the classes and lectures now set on foot.

Berks Archæological and Architectural Society.—In the recent competition organised by this society for measured drawings of any ancient building, or part of a building, in the county of Berks, the first prize of three guineas was awarded to Mr. W. Roland Howell for a set of drawings illustrating St. Nicholas's Church, Newbury. For the second prize of two guineas the judges considered that the drawings of the rood-screen of Warfield Church, submitted by Arthur E. Permain, and the drawings of Childrey Church, near Wantage, by Frederick Musto, were of equal merit, but gave the prize to the former on account of his being the younger student, and at the same time awarded Frederick Musto a special prize of one guinea as a recognition of the merit shown by his work.

London Sanitary Protection Association.—At a meeting of the Council of this Association, held on the 11th inst. at the Offices, 1, Adam-street, Adelphi, Mr. E. B Ellice Clark, M. Inst. C.E., was appointed Consulting Engineer to the Association, in succession to the late Professor Fleeming Jenkin. We are informed that the Association, which has been in existence now five years, consists of over 1,000 members.

H.R.H. the Prince of Wales has intimated his intention of visiting the Lambeth Pottery on Monday next, December 21st, for the purpose of presenting to Mr. Henry Doulton the Albert Medal of the Society of Arts, awarded in recognition of the impulse given by Messrs. Doulton to the production of art-pottery in England.

Sanitary Assurance Association.—At the monthly meeting of the Council last Monday, arrangements were completed for the series of free lectures to be given by the Association at the Parkes Museum during January and February next. The first lecture is to be by Professor Roger Smith, on "A Damp House," on Wednesday evening, January 20th; and on the following Wednesday Mr. F. B. Jessett, F.R.C.S. Eng., will lecture on "Preventible Diseases."

The Parkes Museum.—The tenth annual meeting of the members of the Parkes Museum was held in the Museum on Wednesday last, December 16th, Captain Douglas Galton in the chair. The annual report of the Council was of an encouraging character, the number of members having increased during the year from 260 to 365. The report concluded by stating that a scheme for amalgamating the Sanitary Institute with the Museum was under consideration, upon which the Council hoped to shortly report to the members. The financial statement of assets and liabilities (estimate) to the end of 1885 showed a balance of 191*l.* 16s. 3d. in hand after the purchase of the lease of the present premises. In addition to the report of the Council, a report was submitted by the Joint Committee elected at the extrordinary meeting of members in February last. This Committee organised the great meeting at the Mansion House which had resulted in contributions of upwards of 1,000*l.*, and had enabled the Council to purchase the lease of the Margaret-street premises, thus reducing the annual expenditure for rent from 320*l.* to 200*l.* On the motion of the Chairman, the two reports were unanimously adopted. Dr. Alfred Carpenter proposed a vote of thanks to the joint Committee. This was seconded by Dr. G. V. Poore, and carried. On the motion of Captain Galton, seconded by Professor Hayter Lewis, the retiring vice-Presidents were re-elected, and on the motion of the Chairman, seconded by Mr. Mark H. Judge, the following members of the Council were re-elected:—Dr. Poore, Prof. Reynolds, Mr. Robins, and Mr. Thomas Twining. A vote of thanks to the Chairman concluded the proceedings.

Gleanings in a Gloucestershire Parish. This was the title of an interesting paper recently read before the Archæological Section of the Birmingham and Midland Institute by Mr. Cecil T. Jervis, Mr. R. F. Martineau in the chair. The parish of Painswick, near Stroud, formed the subject of the paper. Mention was made of the various, though few, pre-Norman remains found in the parish. The extract from Domesday gave the earliest documentary evidence now extant of Painswick. A sketch-list of the various families who held the manor from the time of Domesday to the present time, with short accounts of the more striking events in the history of the parish, followed. Such were the court of inquiry by John Talbot, Earl of Shrewsbury, *c.* 1400, the erecting and maintaining of gallows by Sir Anthony Kingston, famed for his "sportive cruelty," and the royal visits of Charles I. and George III. The church was described and attention was directed to its celebrated peal of bells. The Court-house and its associations with Charles I. were not overlooked. A rubbing was shown of an altar-stone built into the wall of the pigsties at the former residence of the lords of the manor. The inscription is perfect and similar to the one found at Deerhurst, a facsimile of which was printed in last week's *Builder*, p. 819. Specimens of the Painswick tokens were exhibited and described. The paper was illustrated by some eighty photographs and sketches, the latter being kindly lent by Mr. U. J. Davis, of Painswick, who has in the press some "Notes on Painswick."

Sewage Purification.—Some weeks ago the Urban Sanitary Authority decided to test the operation of Mr. F. R. Conder's process for sewage purification, and arrangements were made accordingly by the Borough Surveyor. A small tank was fixed at the junction of two sewers at the corner of Bury-street, with the view of purifying the flow of contents, the sewer being, we believe, somewhat unpleasantly known in the vicinity of St. Nicholas Church. The tank was filled with the chemicals used in the process, and was set to work about three o'clock on Wednesday afternoon. A sample was taken at six the same evening, and to the surprise of all concerned the contents of the sewer were found to be running bright and clear, sweeping along with a granular deposit at the bottom, also inoffensive, and being swept into a catch-pit at the mouth of the sewer. The objectionable smells were also destroyed. The proceedings were continued until the heavy rains, causing a rise of the river, hid the mouth of the sewer from view. We need only add that the chemical analysis of specimens of sewage treated by the process showed entire destruction of the noxious matter. A report will in due course be made to the Authority on the subject by the Surveyor.—*Surrey Advertiser.*

Royal School of Mines.—Prof. Warington Smyth, F.R.S., in resuming his lectures upon Mining in the Theatre of the Geological Museum, Jermyn-street, spoke of the depths to which boring operations had been carried, observing that to penetrate much beyond 3,000 ft. is not considered advisable even under circumstances which may appear to be favourable. Veins are not frequently found productive until considerable depths have been reached, as, fer instance, in Cornwall, where no copper of any note has been obtained at a less depth than 30 fathoms. A lode may be large at the surface, and yet not be productive till after many fathoms had been worked out, the probable explanation being the surface exposure to various oxidising agencies. Unless lodes are compact, and the surrounding rock free from fissures so as to prevent the admission of water, which always carries with it carbonic acid, or a clayey soil covers the back of the lode, its productive properties, which may have been originally good, are no longer possible. Not only does the nature of the veins depend upon the physical condition of the rock through which it passes; but the rock itself is often affected by the presence of the vein, due to the chemical action accompanying the process of filling. Bischof had put forth the most probable theory regarding the means by which the lodes were filled, viz., that the various substances are introduced by the underground circulation of water containing the metallic compound in solution, and we know that mineral waters do contain many of the substances which are found in veins.

A New Library at Manchester.—A new library building of four stories has recently been opened in Kennedy-street, Manchester, for the Manchester Incorporated Law Library Society. The basement is used for the storage of old books; the ground-floor contains the books in circulation; the first floor is used as a members' reading-room, and the second floor for meetings of law students. The front is faced with Pillough stone, and is designed in the Early Decorated style. Owing to the narrowness of the streets both at the front and back, an unusual amount of window-surface is obtained. This is, however, arranged for without sacrificing an appearance of stability in the building by recessing the windows somewhat deeply, and forming boldly-projecting piers between them. The contract was taken by Councillor Holt, of Cheetham, for the sum of 2,465*l.*, and the works have been completed within that sum. The brickwork was done by Mr. Healey, of Salford; the stonework by Mr. Kirkham; the furniture and decorations are by Messrs. Goodall & Co., of Manchester; the stained glass by Mr. S. Evans, of Birmingham; and the mosaic work by Messrs. E. Smith & Co., of Coalville. The architect is Mr. Thomas Hartas, of Manchester.

Testimonial to an Architect and District Surveyor.—On Friday, December 11th, the first annual dinner of the Strand Ratepayers' Association was held at the Holborn Restaurant, Mr. E. J. Watherston in the chair. About 150 of the leading ratepayers of the Strand Union sat down to dinner. During the evening a testimonial, consisting of a silver tea and coffee service and silver tray and centre-piece, was presented to Mr. Robert Walker, F.R.I.B.A., District Surveyor of St. Martin-in-the-Fields, in recognition of the valuable services rendered by him in organising and carrying to a successful issue the opposition to the recently attempted wholesale increase in the Strand assessments.

Royal Meteorological Society. — The usual monthly meeting of this Society was held on Wednesday evening, the 16th inst., at the Institution of Civil Engineers, Mr. R. H. Scott, F.R.S., President, in the chair. The following papers were read:—(1) "On the Influence of Forests upon Climate," by Dr. A. Woeikof, Hon. Mem. R. Met. Soc.; (2) "Report on the Phenological Observations for 1885," by the Rev. T. A. Preston, M.A., F. R. Met. Soc.; (3) "Études sur les Crépuscules Rosées," by Prof. A. Ricco, of Palermo; (4) "The Storm of October 15th, 1885, at Partenkirchen, Bavaria," by Col. M. F. Ward, F. R. Met. Soc.

New Clock for India.—The Maharajah of Mysore, following the example of the Hoseinabad Commissioners of Lucknow, is having a turret clock erected at his palace by Mr. J. W. Benson, of London. The new clock has two illuminated dials, strikes the hours, and is fitted with Graham's dead-beat escapement, and all recent improvements.

The Dephosphorisation of Iron.—At a meeting of the Society of Engineers, held on the 7th inst. at the Town Hall, Caxton-street, Westminster, Mr. Charles Gandon, President, in the chair, a paper was read on "The Dephosphorisation of Iron in the Puddling Furnace," by Mr. Philip S. Justice. The author, after referring to the generally-depressed condition of the iron manufacture, showed how it bore most hardly on the works which were dependent on the use of phosphoretic pig-iron, and on those which, in more favourable times, could work up cinder-pig. The presence of even a low percentage of phosphorus in the iron was most injurious to its quality and value, and, with the extremely low prices at present ruling, it was impossible to make these inferior qualities at a profit, and the use of phosphoretic ores must be greatly limited, unless some means were found of obtaining from the pig-iron made from them a superior plate or bar-iron, with cheapened cost of production. Many authorities had said that this was impossible with the ordinary puddling furnace, and that, in the face of the acknowledged success of the Bessemer, Siemens, Thomas-Gilchrist, and other systems of making mild steel, "the days of puddling are gone." But the author contended that this was not the case, and that the process discovered by Mr. Beasley, of Handsworth, and fully tested by two years' working on a considerable scale, met the difficulty by a special treatment of the "fettling" of the puddling furnace, whereby the phosphorus was eliminated during the ordinary process of puddling. The details of this treatment were fully explained, and its results stated to be the production of an iron equal in tensile quality and fibre to the best "marked bars." Experience also proved that the weight of iron produced, instead of being, as usual, less than that of the pig-iron charged into the furnace, was actually more, the process extracting the gain of iron from the "fettling" itself, which is usually lost in the slag as a silicate of iron.

The Hoo Brook Viaduct.—The Hoo Brook Viaduct, near Kidderminster, which has for some time past been in course of construction, has at length been completed, and has received a final visit of inspection from Col. Rich, the Government Inspector, preparatory to being thrown open for traffic. The structure consists of twenty semicircular arches, of 45 ft. span, and 3 ft. in thickness. The total height to the top of the parapet walls is nearly 74 ft., whilst the entire length of the viaduct is 1,100 ft. The arches are supported in the centre by very substantial projecting piers or buttresses, which rise above the parapet walls, and are surmounted by stones, with the names of the engineer, Mr. D. W. Robotham, C.E., and the contractor, Mr. E. Gabbutt, inscribed upon them. The viaduct runs in a slight curve, each end of it being supported by massive abutments and strong counterforts. Over seven million bricks, of the best brindled kind, manufactured by J. W. Howlett, of Oldbury, have been employed in the construction; and the lime used is of blue lias, from Warwick. The contractors in the asphalte department were the Brunswick Rock Asphalte Company, of Gracechurch-street, London. The work has been executed under the management of Mr. J. E. Gabbutt, with Mr. Brain as inspector.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	12 10 0	15 10 0
Sequoia, U.S. ....ft. cube	0 2 6	0 2 9
Ash, Canada ....load	3 0 0	5 0 0
Birch ,, ...	3 0 0	4 10 0
Elm ,, ...	3 10 0	5 0 0
Fir, Dantsic, &c.	1 10 0	4 10 0
Oak ,, ...	3 0 0	5 0 0
Canada	6 0 0	7 0 0
Pine, Canada red	3 0 0	4 0 0
,, yellow	3 15 0	5 5 0
Lath, Dantsic ....fathom	4 10 0	6 0 0
St. Petersburg	5 0 0	7 0 0
Wainscot, Riga....log	2 15 0	4 10 0
,, Odessa	3 12 6	3 15 0
Deals, Finland, 2nd and 1st...std. 100	7 10 0	8 10 0
,, 4th and 3rd	6 0 0	7 10 0
Riga	6 0 0	8 0 0
St. Petersburg, 1st yel.	9 0 0	15 0 0
,, 2nd ,, ...	7 0 0	8 15 0
,, white	8 0 0	10 10 0
Swedish....	6 0 0	15 10 0
White Sea	8 0 0	18 0 0
Canada, Pine 1st	17 0 0	31 10 0
,, 2nd	12 0 0	17 10 0
,, 3rd, &c.	7 0 0	10 0 0
,, Spruce 1st	9 0 0	12 0 0
,, 3rd and 2nd	6 0 0	8 0 0
New Brunswick, &c....	5 0 0	7 0 0
Battens, all kinds	4 0 0	12 0 0

TIMBER (*continued*).	£. s. d.	£. s. d.
Flooring Boards, sq. 1 in.—Prepared, first	0 9 0	0 13 0
Second	0 7 6	0 8 6
Other qualities	0 5 0	0 7 0
Cedar, Cuba....foot	0 0 3½	0 0 4
Honduras, &c.	0 0 3	0 0 4
Australian	0 0 3	0 0 3½
Mahogany, Cuba	0 0 5	0 0 7½
St. Domingo cargo av.	0 0 5½	0 0 7½
Mexican ,, ...	0 0 4	0 0 5
Tobasco cargo av.	0 0 4	0 0 6½
Honduras cargo av.	0 0 4½	0 0 6½
Maple, Bird'seye	0 0 3½	0 0 6
Rose, Rio ....ton	7 0 0	16 0 0
Bahia....	6 0 0	14 0 0
Box, Turkey	5 0 0	18 0 0
Satin, St. Domingo .... ft.	0 0 0	0 0 0
Porto Rico	0 0 0	0 0 0
Walnut, Italian	0 0 4	0 0 5
METALS.		
IRON—Pig in Scotland ....ton	2 2 6	0 0 0
Bar, Welsh, in London....	4 15 0	5 0 0
,, ,, in Wales	4 7 6	4 10 0
,, Staffordshire, London	5 15 0	7 0 0
Sheets, single, in London....	7 10 0	9 0 0
Hoops ,, ...	6 5 0	7 10 0
Nail-rods ,, ...	5 15 0	7 0 0
COPPER—		
British, cke. and ingt. ....ton	44 0 0	45 0 0
Best selected	45 0 0	46 0 0
Sheets, strong....	54 0 0	0 0 0
,, India	48 0 0	48 10 0
Australian, fine cash....	0 0 0	0 0 0
Chili, bars ,, ...	41 2 6	41 15 0

METALS (*continued*).	£. s. d.	£. s. d.
YELLOW METAL....lb.	0 0 4½	0 0 4½
LEAD—Pig, Spanish	12 2 6	12 5 0
English, com. brands	12 12 6	0 0 0
SPELTER—		
Silesian, special ....ton	15 2 6	15 7 6
Ordinary brands	14 17 6	15 0 0
TIN—		
Banca	96 0 0	0 0 0
Billiton	94 0 0	0 0 0
Straits	93 10 0	94 0 0
Australian	93 10 0	94 0 0
English ingots....	97 0 0	0 0 0
ZINC—		
English sheet	17 0 0	17 10 0
OILS.		
Linseed ....ton	20 5 0	20 15 0
Cocoanut, Cochin	30 0 0	0 0 0
Ceylon	26 15 0	0 0 0
Copra....	0 0 0	0 0 0
Palm, Lagos	29 10 0	0 0 0
Palm-nut Kernel	25 0 0	25 10 0
Rapeseed, English pale....	23 10 0	24 0 0
,, brown	22 0 0	0 0 0
Cottonseed, refined	18 5 0	20 10 0
Tallow and Oleine	25 0 0	40 0 0
Lubricating, U.S.	7 0 0	10 0 0
,, Refined	4 0 0	10 0 0
TURPENTINE—		
American, in cks. ....cwt.	1 6 9	1 7 0
TAR—Stockholm ....brl.	0 18 6	0 19 0
Archangel....	0 11 6	0 12 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
New Wing to Buildings	East London Hospital...	Not stated	March 1st	ii.
Detached Hospital	Montrose Royal Lun. As.	do.	Not stated	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Albany Institute and Hall, Slough	The Committee....	H. A. Cheers	Dec. 19th	ii.
Erection, &c., New Station, Offices, &c.	L. B. and S. C. Ry. Co.	*Official*	Dec. 21st	ii.
Sanitary Works and Alterations	Guardns of St. George-in-the-East	Wilson, Son, & Aldwinckle....	Dec. 22nd	ii.
Repairs to Houses, Camberwell		R. Bennett....	Dec. 28th	ii.
Storehouse and Offices, &c.	The Corporation of Trinity House	*Official*	Dec. 31st	ii.
New Post-Office at Wisbech	Com. of H.M. Works ...	do.	Jan. 1st	ii.
Police Station, Canning Town	Recevr. Met. Police Dis	do.	Jan. 2nd	ii.
Sewerage Works....	Beaumaris Corporation	Shone & Ault	Jan. 4th	xiii.
Roads and Sewers	Com. of H.M. Works...	*Official*	do.	ii.
Collection, &c., of Dust	Wandsworth Bd. of Wks	do.	Jan. 5th	ii.
Removal of Sweepings, Dust, &c....	Chiswick Local Board	A. Ramsden	Jan. 6th	ii.
Sewering, Road-making, York Paving, &c.....	do.	do.	do.	xiii.
Materials and Works	Liverpool Corporation	*Official*	Jan. 9th	ii.
Gasholders and Apparatus	Glamorgan Co. Asylum	Giles & Gough	Jan. 13th	ii.
Sewage Works	Dorking Local Board...	Smith & Austin	Jan. 18th	xiii.
Boundary-Walls, Abutments, &c., for Bridge	Colne and Marsden L. B.	H. Bancroft	Feb. 2nd	ii.
Ironwork for Bridge....	do.	do.	do.	ii.
Cast-Iron Mains, &c., for Water-Supply	City of Bombay	*Official*	March 18th	ii.
Additions to School of Art, Bromley	The Committee	Potts, Sulman, & Hennings	Not stated ...	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Assistant Surveyors	Civil Service Com.	Not stated	Jan. 5th	xvi.
Building Inspector	Willesden Local Board	2*l.* 10s. per week ...	do.	xvi.
Surveyor and Inspector of Nuisances	Wavertree Local Board	220*l.*	Jan. 8th	xvi.

TENDERS.

AYLESBURY.—For additions and alterations to a cottage at Bishopstone, for the Right Hon. Lord Carrington. Mr. J. Carter Jonas, surveyor, Cambridge:—

Ball	£174 0 0
Harris....	173 15 0
Rose Bros....	160 0 0
Heley	154 0 0
Grist	138 15 0

BARNET.—For proposed detached house in Manor-road, for Mrs. Schwier. Mr. Joseph White, surveyor:—

Miller	£1,372 0 0
J. Baughen	994 0 0
Williams....	898 0 0
James	834 0 0
Curnow	793 0 0

[All of High Barnet.]

BRIDGEND (Glamorganshire).—For extension of gas-works at the County Lunatic Asylum. Messrs. John Giles & Gough, architects. Quantities by Mr. C. H. Goode:—

W. Church....	£2,999 0 0
G. Drew	2,869 0 0
G. James & Sons	2,750 0 0
Thomas, Watkins, & Jenkins	2,685 0 0
J. Jones & Sons....	2,650 0 0
D. C. Jones & Co.	2,590 0 0
J. Richards....	2,487 0 0
H. Hilton & Sons....	2,399 0 0
Stephens & Bastow	2,350 0 0
John Schofield	2,218 0 0
A. J. Beavan....	2,200 0 0
Chas. Claridge	2,137 0 0
David Davies....	2,125 0 0

BOURNEMOUTH.—For repairing Award Roads A.W. (Canford Cliffs-road) and A.Z., for the owners of the Canford Cliffs Estate, West Bournemouth. Messrs. Kemp-Welch & Pinder, architects to the estate:—

H. Pond....	£272 15 0 !
G. Troke	191 2 6
C. Strickland....	131 10 6
W. A. Guy....	125 0 0
Saunders & White (accepted)	36 15 0 !

CARDIFF.—For building a new grand stand in Cardiff Arms Park, for the Cardiff Football Club. Mr. Chalton James, architect and surveyor:—

J. Gibson (accepted)	£300 0 0

LONDON.—For alterations to Nos. 447, 449, 457, and 459, Hackney-road, for Mr. H. W. Lee. Mr. G. Chuter, architect:—

Wetherilt, Lee, & Co....	£1,614 0 0
Laughton	1,643 0 0
Jackson & Todd	1,412 10 0
Thomersen & Son....	1,372 0 0

LONDON.—For the erection of new warehouse, and construction of a bleaching-room, hot-room, and furnace-room, at No. 45, Houndsditch. Messrs. William Reddall & Son, architects and surveyors, South-street, Finsbury:—

Barnett	£1,849 6 0
Heeps	1,521 0 0
Colls & Sons	1,516 0 0
Pritchard	1,489 0 0
Woodward	1,461 0 0
Nightingale	1,283 0 0
Kilby & Gayford	1,180 0 0

NEWPORT (Mon.).—For alterations and additions to offices, Dock-street, for the Newport Harbour Commissioners. Mr. E. A. Lansdowne, architect :—

C. Colly, Newport	£350 0 0
Edwards & Roach, Newport	835 0 0
Wm. Price, Newport	817 0 0
John Linton, Newport	700 0 0
Wm. Jones & Son, Newport	667 0 0
Wm. Blackburne, Newport (accepted)	645 0 0
C. Miles	645 0 0
A. Davie	625 0 0

NORTHAMPTONSHIRE.—For farm buildings at Barrowden, Rutland, and Easton, Northamptonshire. Mr. J. B. Corby, architect and surveyor, Stamford :—

	Barrowden. £. s.	Easton. £. s. d.	Total. £. s. d.
Dean	600 0	720 0 0	1,320 0 0
Scholes	663 8	651 5 11	1,314 13 11
Ludlow & Emerson	633 18	670 15 0	1,304 13 0
Roberts Bros.	632 0	666 0 0	1,298 0 0
Woolston	616 0	659 0 0	1,275 0 0
Sharp & Cook	605 8	615 14 1	1,221 2 1
Perkins Bros.	623 0	582 0 0	1,205 0 0

PARC GWYLLT (Glamorganshire).—For the erection of farm buildings and other works at the New Glamorgan County Lunatic Asylum. Messrs. John Giles & Gough, architects. Quantities by Mr. C. H. Goode :—

Pearse	£6,304 0 0
G. Drew	5,292 0 0
W. Church	5,271 0 0
J. Schofield	5,218 0 0
Thomas, Watkins, & Jenkins	5,171 0 0
Chas. Claridge	5,030 0 0
D. C. Jones & Co.	4,959 0 0
H. Hilton & Sons	4,799 0 0
David Davies	4,590 0 0
J. Richards	4,349 0 0
A. J. Beavan	4,170 0 0
J. Jones & Sons	4,070 0 0
Stephens & Bastow	4,050 0 0

SANDHURST (Berks).—For alterations and additions to Longdown Lodge, Sandhurst, Berks, for Mr. C. A. Wild. Mr. W. Ravenscroft, architect, Reading :—

John Bottrill, Reading	£3,450 0 0

[Accepted. No competition.]

STOKE NEWINGTON.—For the erection of a fire-brigade station at the corner of Leswin-street and Brooke-road, Stoke Newington, for the Metropolitan Board of Works. Mr. Geo. Vulliamy, architect; Messrs. Nixon & Raven, surveyors :—

Hack	£6,938 0 0
Deacon & Co.	6,850 0 0
Dickinson	6,841 0 0
Wood	6,773 0 0
Staines & Son	6,690 0 0
Garrud	6,677 0 0
Stephenson	6,500 0 0
Toms	6,477 0 0
Green	6,467 0 0
Manley	6,417 0 0
Braid	6,400 0 0
Brass & Son	6,393 0 0
Oldrey	6,186 0 0
Godfrey	6,160 0 0
Greenwood	6,075 0 0
Johnson	6,047 0 0
Howell	5,985 0 0
Pearce & Lansdowne	5,959 0 0
Stimpson & Co. (accepted)	5,880 0 0

TUNBRIDGE WELLS.—For terrace of five houses on the Prospect Lodge Estate, London-road, Tunbridge Wells. Mr. W. B. Hughes, architect, Tunbridge Wells :—

Grover	£10,093 5 0
G. Winnifrith	9,586 0 0
G. Edwards	9,576 18 0
Gallard & Son	9,280 0 0
J. Jarvis	8,792 0 0
Beale & Son	8,432 0 0
A. Yeatman	8,255 0 0
Strange & Sons	7,857 0 0

TUNBRIDGE WELLS.—For making new private road through the Prospect Lodge Estate, Tunbridge Wells. Mr. W. B. Hughes, Tunbridge Wells, architect :—

J. Jarvis	£535 0 0
Strange & Sons	511 0 0

WAPPING.—For the erection of warehouses in High-street, for Messrs. Banes, Noël, & Co. Mr. Horace A. Alexander, architect. Quantities supplied by Mr. Edwin A. B. Crockett :—

	Main block.	Office block.	Total.
J. Anley	£21,317	£3,150	£24,467
Holland & Hannen	20,600	3,012	23,612
G. H. & A. Bywaters	20,374	2,964	23,338
T. Rider & Son	20,232	2,996	23,228
Outhwaite & Son	20,083	2,953	23,036
M. Patrick & Son	19,900	2,900	22,800
J. Morter	19,621	2,895	22,516
Ashby & Horner	19,480	2,989	22,469
Balaam Bros.	19,477	2,605	22,082
E. Lawrence & Sons	19,230	2,696	21,926
W. Brass & Son	19,097	2,685	21,782
J. & J. Greenwood	18,740	2,580	21,320
Kirk & Randall	17,859	2,578	20,439
B. E. Nightingale	17,560	2,419	19,979

SPECIAL NOTICE.—As we shall go to press with next week's number a day earlier than usual, all lists of Tenders intended for insertion in that number must reach us by 4 p.m. on *WEDNESDAY*, December 23.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

W. S.—H. A. C.—T. B.—P. & Son.—T, C. E.—H, A.—E. S. B.—N. W. (your letter too diffuse; a brief statement of the expedient would have answered all the purpose).—A. N. W.—W. & R.—B. E. N.—J. B.—W. R. & Sons.—J. W.—F. J. C.—W. de G. B. (next week).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHRISTMAS WEEK.—"THE BUILDER" for the Week ending DECEMBER 26th, will be issued on THURSDAY, the 24th. Advertisements for insertion in that issue must therefore reach the Office before THREE p.m. on WEDNESDAY, the 23rd. Alterations in Standing Advertisements, or ORDERS TO DISCONTINUE the same, must be at the Office by TEN o'clock on TUESDAY Morning.

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for Series of Trade Advertisements, also for special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED.

FOUR Lines (about THIRTY words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent-garden, W.C. to
DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

The "NEW YEAR'S NUMBER" will be published on FRIDAY, the 1st of JANUARY next, Price 4d. Advertisements for this special issue should be sent to the Office as early as possible.

PERSONS Advertising in "The Builder," may have *Replies addressed to the Office*, 46, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum PREPAID. To all parts of Europe and America, 26s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOURDRINIER, Publisher, No. 46, Catherine-street, W.C.

Best Bath Stone, for Winter use.
WESTWOOD GROUND,
Box Ground,
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